The Builder.

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The Pressure of Population on the Means of Support.

PUBLIC attention has, within the last few days, been so pointedly called to the grave question of the pressure of population on the means of support, that we think good service may be done by brushing away some of the cobwebs that have been allowed to gather over the main principles involved in the inquiry. It is not, indeed, long since we saw in the columns of a periodical which addresses a class of readers not dissimilar to our own, the statement,—made, indeed, by a correspondent, but printed without comment or correction,—that the population of the United Kingdom doubles within forty years! So monstrous a misstatement, on the part of a volunteer instructor of the public, is enough to show that there is room for a little careful examination of the nature we propose to institute.

It is not, of course, in these columns that the physiological part of the question has to be discussed. We look at the relation between mouths and food, from the social point of view, as a matter of industrial, rather than of anthropological, science. It is always unsafe to quote an author, except with his books in hand; and as the works of Mr. Malthus do not happen to be on our shelves, we desire to guard ourselves against the danger of attributing to that author any statement for which we do not quote his own words; but we shall not be wrong in urging that it is commonly stated to be the doctrine of Mr. Malthus that, while population increases in a geometrical ratio, the means of supporting population only increase in an arithmetical ratio. A reference to this view may be found in the recently-published autobiography of Miss Martineau, and we think there is little doubt that the latter writer assumed the statement, as we have put it, to be one of undeniable truth.

We deny that statement altogether. We hold it to be, not only impossible of proof, but inconsistent with known fact. The means of human support, of course, are found in the species of either the animal or the vegetable kingdom. No animal is used for human food of which the natural increase is not enormously more rapid than that of man. If children are born, at times, of parents in their teens, it is the exception, rather than the rule. But at what age does a cow calve? At what age does a ewe lamb? At what age does a fowl begin to lay eggs? It is unnecessary to go into mathematical, or even into arithmetical, calculations, to show how immeasurably more rapid is the natural increase of animal food, than of mankind, as a consumer of animal food.

If we turn to the vegetable kingdom, the comparison is still more striking. A thirty-fold increase is not out of the way for the most important vegetables that are eaten by man,—the cereals. In most cases the multiplication of seed is very much greater; in some cases, if not innumerable, at least it is unnumbered. Who has counted the seeds in a poppy capsule? and how many poppy flowers spring from a single seed? In that case, too, the time required for reproduction never exceeds,—unless we store the seed for some other object than that of sowing,—a single year. A grain of corn sown in the spring of one year might, under favourable circumstances, within two years have produced 10,000 grains.

But the arithmetical ratio may be said to apply, not to the organic species themselves, but to the area of land on which they are reared. There is, however, no arithmetical ratio in the matter. There is no shifting ratio to be fixed. There is, if we take the matter in its most abstract form, a certain area of land on the surface of the entire globe, on which, together with the surface of the water, all terrestrial life has its *habitat*. It is a conceivable idea, in the abstract, that the whole world should become so full of human beings as to be converted into one vast city, and that houses and streets should so invade pastures and cornfields that the space for feeding animals, or for growing vegetables, should be restricted. But if we admit that as a conceivable idea, it is not what we can describe as a practical idea. History gives but little support to the view that such a state of things is possible, even at any immense distance of time to which we may hypothetically defer the event. On the contrary, we have quite as much evidence of depopulation as of increase of population. In China the density of the population is calculated at 267 units per square mile. In British India it is 204 units per square mile. In Middlesex it is 40 per acre. But what do we find if we turn to the ancient heart of Empire, and cradle of the human race? What have become of the millions of Babylonia, of Assyria, of the Mesopotamia Valley?—of the countless cistern-builders of Western Palestine? How far are Italy, Sicily, parts of France, Egypt, Turkey, and many other regions from containing the population which they held in imperial or pre-imperial times? Exact statistics fail; but if we regard the inhabited earth as a whole, the evidence is rather to the effect that the numbers of its inhabitants, at all events in the Old World, are now less, rather than more, than they were a thousand or two thousand years ago.

The question, then, of the possible pressure of the population of the world, as a whole, or the means of subsistence, is one of those the useful investigation of which may certainly be deferred for an indefinite period of time. Whether it may assume a practical aspect 500, 1,000, or 2,000 years hence, we need not now pause to guess. In the abstract the inquiry is utterly unpractical, untimely, unphilosophical. There may, however, arise a case of the general question which deserves more serious attention. It may be said that if the question is not a cosmical, or a general human question, it may be an Irish, or a French, or an English question. Earth can feed her children for as long a series of years as the wildest dreamer needs to count. But can the Isle of Dogs feed its own population? Can London? Can Ireland? Can the United Kingdom? These questions are, at all events, near home.

In seeking a reply to these questions we must remember, in the first place, that the fiscal and economical legislation of the present day is something totally different from that which had force when Malthus, and when the great pioneer of economic inquiry, Adam Smith, lived and wrote. The idea of self-contained supply was formerly held to be an essential condition of national safety. So long as we had to look to our own forests alone for the oak, on the growth of which the construction of our navy, and therefore the means of maintaining our maritime supremacy, and of defending our coasts from insult, depended, the maintenance and regulation of our forests was a matter claiming the attention of the Government and of the Legislature. In the same way, when we were dependent on the area of our own island for the supply of the corn we ate, it was needful for the rulers of the State to see that the Commonwealth suffered no damage from the neglect of this essential provision. But the present century has witnessed a total change in these matters: a change, let it be remembered, that does not spring so much from change of opinion as to economic law, as from the change of circumstances produced by the progress of invention. If we were now as dependent as we were in 1815 on the winds and the waves, we could as ill afford as we then could do to depend on the arrival of the food of our population from the Mississippi or from the Danube. If a long-continued wind bound a fleet of 300 vessels under the shelter of the Rock of Gibraltar, as used often to be the case when navigation depended on sails, it would have little effect on the price of bread in London to tell us that there were so many thousand tons of corn shipped for that port. For gold, for cotton, for machinery, people might wait. For food they could not. Thus, the command of ocean navigation which is secured by the invention of Watt has so far stretched our insular boundary, that we can count on the harvests of Russia, of America, and of India, with more certitude, by a very long way, than our grandfathers felt in looking forward to any coming harvest in our own island.

Nor is it a question of navigation alone. Long distances by land are even more formidable obstacles to the economic exchange of products than long distances by sea. The reason is, that land carriage, however we may effect it, is essentially more costly than water carriage. The limit of economical possibility of transport is, therefore, soon attained. Thus, in India, where cost of labour of all kinds is far lower than in Europe, we learn from the July number of the

Edinburgh Review that the ordinary rate of transport by native carts over earthen unmetalled roads is 3d. per ton per mile. This rate comes to something like 5s. 6d. per quarter for a transport of 100 miles. For a carriage of 400 miles the cost would come to the prohibitory amount of 22s. per quarter. It is thus very intelligible how it may be the case that corn should be rotting on the ground in one district of India while people were starving from total absence of food in another. During the Orissa famine, in 1860, when the Government were straining their energies to throw grain into the suffering district, not only did this question of cost arise, but the roads were so cut up by the transport of a quantity of traffic not exceeding 360 tons per diem, that utter disorganisation ensued. No outlay of money could overcome the physical difficulties that attended the conveyance of food to a starving people when once the famine had attained a certain intensity. At the present time, by the means of the East-Indian Railway and the Ganges navigation, rice is sent from Patna to Calcutta, a distance of 333 miles, for the rate of 2s. 11d. per quarter; and wheat is sent from Cawnpore, a distance of 684 miles, for the charge of 6s. 4d. per quarter. In the rich corn-growing valley of the Upper Ganges, corn to almost any requisite amount can be grown and sold for the price of 16s. per quarter, with good profit to the agriculturist. Allowing for purchase, profit, railway carriage, shipping dues, freight by way of the Suez Canal, and all other charges, it is stated by a writer in the April number of the *British Quarterly Review*, that wheat from Cawnpore can be delivered in London at the price of 33s. 4d. per quarter. The average price of wheat in London in January of the present year was 51s. 7d. per quarter, giving a margin of 17s. 6d. per quarter against a shipment from Calcutta, three months previously. It is thus evident that, so far from feeling the pressure of our population on the means of supplying food to be on the increase, mercantile enterprise is not even yet fully awake to the value of the supplies of food that are readily attainable, and that are to be drawn, with little cost and great certitude, from the most fertile districts of the world.

The only needful provision for the equalising of the price of food in different and widely distant markets, for which our improved means of transit have not yet found the means, is that of butchers' meat. Even here, however, enterprise is not to be damped. We owe to the genius and patient toil of the great chemist, Liebig, a permanent addition to the quantity of animal food obtainable in this country, which, though not equal in its food-value to fresh meat or newly-made broth, is yet a real and important addition to our means of sustenance. The importation of meat, not frozen, but kept at a temperature only two or three degrees above freezing, is another method of supply which has attained a certain degree of success. The best opinion that we can form on this subject is to the effect that if this meat be cooked immediately it is removed from the refrigerator, it is very excellent food. The progress of science is now directed to the abatement of the price of human food in the centres of population. We think there is reason to believe that as yet we are only at the A B C of the process. At all events, we know very well that food of all kind is to be obtained as plentifully, as good, and almost or altogether as cheap, in the great brick-and-mortar province of London, as it is in places where cornfields surround the town, and mutton grazes close by on the hills. When we are able to telegraph half round the earth for a cargo of corn, we enrich the producer, while at the same time we diminish the cost of the consumer. The 16s. per quarter given to the Cawnpore corn-grower represents a direct fertilisation, by English money, of land that would otherwise be profitless, and labour that would otherwise be idle. And the London consumer saves 30 per cent. of his outlay by going thus far afield into the world.

It is thus, we think, fully evident that any causes which might, when Mr. Malthus wrote, have justified, to some extent, the statistician in the fear that a growing population might eat itself out of house and home, cannot now be intelligently feared. The price of subsistence, as far as the purchase of food is concerned, so far from being raised by the growth of population (which would be the first sign of the approach of the predicted evil) may be, there is good reason to suppose, hereafter considerably reduced. And it is just where the pressure (in Mr. Malthus's view) ought to be most felt that it will be least felt. It is for the supply of food to the great centres of population that it is best worth the while of all who are engaged in the production or transport of food most strenuously to exert themselves. For the supply of a village it would not be worth while to send corn from the valley of the Ganges. For the supply of a large town it might be desirable. But for the supply of a city or a province, the inducement of profit would be so strong that competition would come into play, and the market would soon fall to such a price as should be commercially, agriculturally, and economically just.

We may, therefore, be perfectly resigned to contemplate any imaginable growth of the human race,—we will not say for the time of our children or our children's children only, but for the next thousand or few thousands of years. The most conscientious man need not disquiet himself by looking further. If, indeed, he looks at every grain of wheat which he is about to send to the mill, and apostrophising it individually should say,—"If I grind you and eat you to-day, you will be gone,—passed away into tissue,—liberated as heat—to-morrow. If I keep you, and sow you, in two years you will have ten thousand grand-children. I cannot eat you!" We must leave so prudent an economist to settle matters with his own hunger. But he will preach in vain to others. The grain of wheat, indeed, had it such a voice as Esop would have given it, might reply,—"For that very end I came into existence. It is that very prolificness of fruit, common to me and to other articles of food,—such, for instance, as the heavy shoals of the herring,—which justifies you in eating me. You cannot eat us all, do your best. Consume what you can, the corn of a single year would produce plenty for all possible consumers for a longer time than were required to provide against the seven menaced evil years of Pharaoh." Human food, and all supplies of human want, ask from man not abstention,—not even temperance, in their use,—all that they require is the return of wise and well-directed labour.

If we look at man as an economical product, he is, no doubt, a costly one. If, however, we take a youth of sixteen, from the working classes, fit to earn his own bread, used to aid in gaining comforts for his parents, we can hardly set down his cost, up to that time, whether borne by his parents, or in any way aided by the State, at more than from 150*l.* to 180*l.* We cannot put his earnings, even at the most unskilled labour, at less than 18*l.* per year, of which we may allow half for his maintenance. Even at these lowest resistance prices, he is paying 4 per cent. on his cost from infancy. But his powers of earning are daily increasing. Soon he will be able to earn 10*s.*, 20*s.*, 30*s.* a week. And whoever gains the profit of that work, whether it be the workman himself, his employer, or any group or combination of individuals, all the excess of product above consumption is so much clear gain to the nation. Then let us compare the earning powers of the apter and more gifted men. Who shall estimate them? If a statesman be paid 5,000*l.* per annum, or an archbishop 20,000*l.*, what would be the annual value to England of Brunel, Fairbairn, Whitworth? Thus while the humblest and the poorest child, supposing it to be healthy, becomes self-supporting at an early age, and not only repays by his labour the cost advanced for his support in infancy, but is a positive source of national wealth, at the other end of the scale the economic value of the unit,—the highest production of human growth,—is simply incalculable.

We have seen that there is no fear that Earth will fail to feed her sons. We have seen that there is no fear that England is becoming over-populated. We have seen that each additional unit of the population (if healthy, industrious, and moral) is an addition to the living spring of national wealth. What remains to be said on the other side?

There is this. No doubt the maintenance of an infant is a direct, and, for the time, unremunerative charge on the parents. Let us leave natural affection, and the charms of the home-life out of the question. A poor man and his wife, with a young and increasing family, will be pinched in proportion to the number of mouths that they have to feed, and that are not provided for by the hands of the owners. This, no doubt, is a hardship. But what follows? To discourage the increase of families, for this reason, while selfish as far as the individuals are concerned, would be disastrous to the State. Very soon,—too soon, indeed,—the little hands become able to earn. The maturer and later life of the good parents will afford a recompense for the self-denial of their youth. Even their own hard earnings will have been laid out to good interest, in the physical condition of their children. But the point we have now in view is not to interfere with the regulation of the family, but to point out that the statistician or the public writer who does what he can to discourage the growth of population, is working in diametrically the wrong direction. He is anti-patriotic. Let us do what we can for the right direction of industry, for the physical and industrial education of the working classes, to make each unit more productive. But if writers must indulge in hobbies, and propose reforms that would crush out a large portion of human life in their enforcement, let them look in the opposite direction. Let them see how the State, or the parish, or the rich man, or the charitable man can give that degree of aid to the healthy, hard-working, honest parent, during the ten or twelve years in which a rising family demands rather more food than they can ordinarily earn, that shall ensure the supply to the infant of food, clothing, and tendance. Let us look, as a matter of public justice and public duty, to the careful upbringing of those units of national wealth on whom the future of the country depends, and as to whom it may now be said, with some justice, that we look to the poor man, at his own expense, to provide the very sap and nutriment for the England of the future.

ANNALS OF WINCHCOMBE AND SUDELEY.

THE large quarto under this title which is before us is a production of some interest in its class, in regard to the feeling and intent under which the book* has been brought out. It is the attempt of the lady of the household who now hold Sudeley Castle to give an account, as full and connected as possible, of the past history of the manor and its neighbourhood; an idea apparently inspired not by a mere antiquarian spirit, but by a real love for the place which has become her home, and a desire to place on record the vicissitudes of its past history. Mrs. Dent says in her preface (addressed "To my Husband") that she has endeavoured "to bind up into one harmonious whole the interesting facts which cluster so thickly around Winchcombe, once the capital of Mercia, and the thousand historic associations with which Sudeley Castle, our beautiful home, abounds." There is something very pleasing in the feeling of love of the home, together with desire to impart to others the interest of its history, which seems to have prompted the production of the book; and apparently no pains have been spared in making it, in a literary and archæological point of view, as complete as possible, by researches wherever any information could be gleaned, and by the addition of numerous and mostly well-executed illustrations of the buildings and other remains connected with the history; while the appearance of the book, a large quarto printed on fine paper, is such as to make it an attractive addition to any library or drawing-room table.

The records of antiquity connected with the small town of Winchcombe, now a decayed borough near the Cotswold Hills, commence from the year 787, when King Offa, of Mercia, built a nunnery at "Winscelcumbe," as the name stands in the Domesday Book. The ancient history of Winchcombe naturally brings forward that of Sudeley, its near neighbour, and closely connected with it in after times. But though this is the earliest authenticated date referred to, remains found within late years at Sudeley connect it with the pre-Roman period; the discovery of the British barrow called Belas Knap, or Beller's Nap, having been the subject of the attention of the Society of Antiquaries in April, 1866, and described in their proceedings of that date. The district was subsequently, as is well known, a great centre of Roman occupation, and the plan is given of a Roman villa, discovered in 1863, on the Wadfield Farm connected with the estate. An interesting and very characteristic tesselated pavement was found absolutely complete, and is now preserved carefully in the Sudeley greenhouse, with only the loss of the pieces abstracted during one Sunday afternoon's relic-seeking on the part of the Winchcombe public, before the pavement could be removed to a place of secu-

* Annals of Winchcombe and Sudeley. By Emma Dent. London: John Murray. 1877.

rity. A coloured drawing of this pavement is also given, as well as a plate representing many small articles of Roman workmanship, including the foot of a well-executed statue, found about the neighbourhood.

A good deal of curious history is got together concerning the Saxon kings of Mercia, including the translation of a Saxon MS. in the Bodleian Library, unpublished, giving the life of St. Kenelm; but the sketches engraved of Kenelm's chapel, &c., before demolition, though interesting as representations of bits of old building, have nothing really to do with this period of history, as the authoress is probably aware. It is otherwise with the illustrations of the Norman chapel at Postlip, and its doorway, given at page 79. The ornamentation of the doorway, which we do not remember to have seen published, is rich and interesting (transitional Norman), and the perspective sketch of the chapel shows an exceedingly picturesque little building, considerably altered from its original form, but still retaining a good deal of its old work, and a great deal of Old-world character. It was built in the reign of Stephen, by William de Somers.

In the course of the history of Sudeley we meet with passing mention of little practical facts which are almost more interesting to us than the larger facts of the contentions and partisanships of barons for and against the monarchical power or the privileges of the order. In the reign of John we find mention of the fact that "Ralph de Sudeley granted the monks leave to make a ditch, which brought the water to their mill in a straight course, and John Blundell had 8d. given him for damage to his fulling-mill thereby sustained. The abbey was supplied with water by charter from Postlip and Sudeley. These facts show that even in those early times it was necessary to protect the rights of water, and that damage done by converting the course of a stream demanded compensation." Winchcombe was at this time so extensive as to possess eleven large streets, with a booth-hall and a gridhall. Among the sketches of churches belonging to this date that of Stanley Pontlarge Church, and its interior Norman arch, with one jamb completely out of the perpendicular, is interesting, as also that of Gretton Church, "disused June, 1868"; and high time, too, one would say, looking at the state of the barn-like edifice; though there is not in the sketch any evidence as to the date and style, and probably the little building, as it existed at that date, was of much less antiquity than some village churches that are still in use.

At the time of the dissolution of the monasteries under Henry VIII., Winchcombe Abbey was one of the most prosperous of all, and its last abbot but one, Richard Kydderminster, was said to have been the ablest man who had ever ruled there, though by his arrogant pretensions he was among those who aroused in the laity "misgivings of the Church," and the idea of the necessity of a Reformation. In connexion with his name comes one of the most picturesque architectural remains illustrated in the book, the old house in High-street, Winchcombe, bearing his initials, R. K., as an ornament in the perforated barge-board. In a simple way it is one of the most picturesque specimens we have ever noted of the old-fashioned English Mediæval house, with overhanging upper story on heavy brackets, and we owe thanks to "E. T. Browne, esq.," who made the drawing of the house, before its demolition in 1880, from which Mrs. Dent's illustration is taken; and who must have done good service in this way as an illustrator of the old buildings of the neighbourhood, since his name appears to sundry other drawings of the same kind of value, also illustrating houses that are now defunct. The Abbey doorway, illustrated page 145, "now standing in the Abbey grounds," must have been a very late addition to the architectural embellishments of the place, since it is completely in the new Classic or what is generally called Jacobean style, and could at the earliest only have been erected just in time to furnish convenient and dignified egress to the ejected monks, unless the building survived, by some accident, considerably beyond the close of the reign of Henry VIII. To the same industrious sketcher, Mr. E. T. Browne, we owe drawings of the Abbot's House, demolished in 1815, having been previously used as a workhouse; and it is on record that he used all his efforts to save the house from destruction at the hands of its then owner, Mr. Williams. Engravings from his two sketches are given, showing a picturesque late Gothic house, with octagon bay windows carried up the whole height. This same demolishing Mr. Williams then commenced a search on the site of the Abbey for "materials and antiquities," whether with a view of destroying these also does not appear: but this is the account given by the praiseworthy and conservative E. T. Browne of part of the results:—

"The deep and massive foundations of the church were clearly traced, and several ponderous stone coffins, containing remains of human skeletons, were discovered; but the circumstance which attracted most particular attention arose from the examination of a small stone coffin, which was found at the east end of the interior of the church, close by the side of another, of the usual size. Upon the removal of the flagstones which covered it (and which took place in the presence of the writer), there appeared a skull, with a few of the other larger bones, and a very long-bladed knife, which had become a mass of rust, and fell to pieces on being handled. The bones also vanished, like a vision, from their sight, the moment they were exposed to the air. Speed says, as before observed, that 'Kenelm was interred in the monastery, near to his father,' and no two coffins, except those before mentioned, were found near together. This circumstance, therefore, combined with that of the knife, which it is possible the murderer left with the body, and which might have been removed and deposited with it, induces a celebrated antiquary to form the conclusion that the largest coffin was Kenulph's, and the smaller one Kenelm's."

The celebrated antiquary was Fosbroke, who was also present; and if his conjecture was correct, and this was really the knife with which St. Kenelm, whose departure to a better world was artificially hastened, was put to death, this is certainly a striking example of the truth of the proverb that "Murder will out," even after the lapse of indefinitely long periods. But this we can but regard, after so long a time, as simply a conjecture within the bounds of possible truth. Murders were even more common then than now, and there might be many as probable claimants, for all we know, for the honours of the coffin and the "long-bladed knife."

Following upon these particulars as to recently discovered traces of the Abbey come some chapters of considerable interest from the point of view of social history, in regard to some noted people whose names and history have been connected with Sudeley and Winchcombe. Among these is Catherine Parr, the fortunate surviving queen of Henry VIII., and who married Lord High Admiral Seymour, of Sudeley, after he had first prudently attempted to win the hand of Princess Elizabeth, and been by her repulsed; and the fac-simile of the dowager Queen's letter accepting him is engraved, from the original formerly in the collection at Strawberry Hill,—a letter in a stiff, picturesque, but to the modern reader very illegible hand, looking like a kind of informal and obscure copper-plate engraving. During her residence at Sudeley the place became also to some extent a kind of headquarters of the new learning, where Miles Coverdale, the Protestant Bishop of Exeter, projected and perhaps partly carried out his revised translation of the Bible; and young Lady Jane Grey was also a constant inmate of the place.

But we have not space to continue our memoranda, even in so brief and discursive a manner, from Mrs. Dent's three hundred and odd large and well-filled pages. There is much interesting matter in regard to the history of the Chandos family, who acquired Sudeley under the Stuarts, and of the fortunes of the place under their inhabitation; and some further illustrations, one in particular showing the old oak bedstead which came from Cumnor Place to Sudeley, containing in the woodwork, just above the head of the occupant, a small false panel, which could be taken out, and revealed a concealed crucifix between them, telling a strange and pathetic story of an effort to keep up secretly the old ritual and the old faith after it had publicly been pushed from its throne. The plan is given (p. 207) of the old "Pleasaunce" of the castle, with remains of circular hedges and pebbled walks in rings one within another; a feature of which the very name, "Pleasance," as well as the formal and symmetrical arrangement of the whole, takes us back to long-forgotten days of stately merry-making among those whose names and titles have long passed away, and whose place knows them no more. The present state of Sudeley is shown in a lithograph from a drawing made in 1856, showing the remains of Gothic buildings of Perpendicular date in the foreground, and a quiet-looking modern Domestic Gothic house surrounding three sides of a quadrangle beyond; the drawing is not, unfortunately, a very effective one. The Dukedom of Chandos became extinct in 1789, with the grandson of that Duke who figured as "Timon" in Pope's satire, but it was revived in favour of his son-in-law, the late Duke of Buckingham. But in the time of Cromwell the castle, as a building, had been deliberately "slighted," *i.e.*, demolished so as to be untenable as a military post, and from that time till 1830, when the property passed into the hands of John and William Dent (uncles of the present owner), Sudeley Castle appears to have been almost a neglected ruin. At the time they purchased the castle "the Wynns were the tenants and resided there; before them, a man of the name of Attwood; it was then a public-house (the Castle Arms). . . . . So careless were the owners, that Attwood pulled down a great deal, and sold oak, beams, and lead, and other materials, which were used freely in the neighbourhood." The Sudeley estate has now, however, passed into the hands of owners who can appreciate the historical and archæological interest of its surroundings, of which appreciation solid practical evidence is afforded by the elaborate and interesting volume of which we have mentioned a few points only.

THE VICTORIA DOCK EXTENSION.

VISIT OF THE SOCIETY OF ENGINEERS.

THE notable and interesting works now in progress for the extension of the Victoria Dock, to which we made reference a year ago;* were on Tuesday last (by permission of the London and St. Katharine's Dock Company, and of the engineer, Mr. A. M. Rendel, M.A.) visited by a large number of the members of the Society of Engineers, headed by Mr. Thomas Cargill (President) and Mr. Perry F. Nursey (secretary). Leaving Fenchurch-street Station shortly before one o'clock, the visitors were conveyed to the Custom House Station, Victoria Docks, where they were received by the resident engineer, Mr. A. O. Andros, M.I.C.E., and the contractors' agent, Mr. W. Colson. Passing along the quays of the existing dock basin, the visitors proceeded to the easternmost point of the present dock, or rather to the easternmost end of that portion of the present dock known as the "canal." Just beyond this point the works are exceptionally heavy. The extension will be approached from the old portion of the dock by a cut or passage about 200 ft. long and 80 ft. wide, and as the Woolwich branch of the Great Eastern Railway crosses this part of the district, it has been necessary to temporarily divert it some distance further eastwards during the construction of the tunnel which will eventually carry the railway beneath the water in the cut or passage referred to, on about the same course as the line took before, although at a much lower level, the rails being 43 ft. 6 in. below Trinity high-water mark. To carry the railway under the dock works at this level of course entails very heavy works in the shape of approaches on either side. The railway will be carried under the water by means of a double tunnel, resembling Brunel's tunnel under the Thames, one side being used for the up line and the other for the down line. The object of this double tunnel is, of course, to diminish the height, so as to get a sufficient depth of water over the tunnel without going unnecessarily deep down. Each of these double tunnels will be 350 ft. long, 14 ft. wide, and about 16 ft. high. The double tunnel opens out at either end into a single span bell-mouth or tunnel 33 ft. wide, and 24 ft. high from the rails to the crown of the arch, the additional height rendered necessary for a single arch being attainable where the railway passes under dry land. At the points of junction of the double tunnel with the bell-mouth or single-span tunnel at either end, capacious ventilating shafts are provided. The tunnels are 6 ft. thick, constructed in gault bricks set in Portland cement mortar composed of two of sand to one of Portland cement, so as to ensure rapid setting, and backed by Portland cement concrete made of six of ballast to one of cement. The brickwork at the crown of the double arch underneath the water will be 4 ft. thick: The depth of water over the tunnel will be 25 ft. 6 in. Near this portion of the dock it is proposed to construct two graving docks capable of taking vessels 450 ft. long.

Having inspected this portion of the works, both above and below ground,—the greater part of the tunnels being completed,—the visitors proceeded to the office of the contractors (Messrs. Lucas & Aird), where a cold collation awaited them,—a very acceptable preparation for the fatigues of the subsequent four or five hours. The party was then conveyed by locomotive in three carriages along the entire length of the south side of what is to be the new ninety-acre dock, alighting at the extreme easterly point of the works, where the new entrance from the Thames is being constructed. The total length of the works

* *Builder*, vol. xxxiv., p. 602.

from end to end, including jetties, is one mile and three-quarters. The entrance to the dock is admirably placed, facing down the river at the lower end of Galleon's Reach, where the Thames is one-third wider than at the present entrance to the docks three miles further up the river. Vessels which will enter the Victoria Docks will thus avoid three miles of dangerous navigation through Galleon's, Woolwich, Bugaby's, and Blackwall Reaches. It was at first intended merely to make a narrow "gut" or canal from the existing docks to the point chosen as the entrance to the docks; but the dock company thought that while they were about it they might as well excavate sufficient material to make a good commodious dock. Open-timbered jetties, constructed of creosoted piles, 14 in. square, project into the river on either side for a distance of 250 ft., and form a sort of trumpet-mouth entrance to the lock-gates. The temporary coffer-dam which is to keep out the tidal water during the construction of the lock-gates and approaches is all but closed in, only a few more piles requiring to be driven to exclude the water. It is constructed entirely of two rows of piles 14 in. square, all the joints being caulked, the space between the inner and outer row being filled in with Medway puddle, well rammed. Between the lock and the extension a temporary safety-bank, hearted with puddle, has been thrown up, with the view of preventing the dock works and the surrounding marshy country from being inundated, in the event of any accident happening to the coffer-dam,—a contingency not very likely to arise. We may note here that a temporary puddle-wall, 12 ft. high and 8 ft. thick, backed by an ample quantity of earth, runs down the entire south side of the great dock. This also is for purposes of safety. Mr. Andros pointed out to the visitors how this portion of the Essex coast was protected from flooding by banks of earth, supposed to date from the time of King Alfred. The new entrance-lock, when finished, will be probably the largest in the world, being nearly 800 ft. long over all. The distance between the outer and inner gates will be 550 ft., so that a vessel upwards of 500 ft. long could ride between them. There is also an intermediate pair of gates. The lock-walls are of concrete, varying in thickness according to requirement at different points, faced with gault brickwork, 2 ft. 3 in. thick. This is the only portion of the work executed in brickwork, the only reason for preferring brick to concrete being that it is thought it will better stand the heavy rubbing and attrition of passing barges and vessels, and the prods of lightermen's boat-hooks, &c., than new concrete. The culverts to allow of the passage of water from one side of the lock-gates to the other are unusually large, in order that a vessel passing into or out of the lock at low water may be rapidly raised or lowered to the level of water in dock or river. The culverts are provided with grooves cut in Penrhyn granite. In these grooves, which will be polished, heavy doors of greenheart timber will slide up and down by means of hydraulic power, and through these doorways the water will rush with great force. The doors and grooves will be provided in duplicate on each side of the lock, as a precaution against accident. The walls of the culverts are 7 ft. thick, and are built of gault bricks set in cement and faced with the hardest and best Staffordshire blue bricks pointed in cement mortar composed of 1 of sand to 1 of cement. The masonry of culverts is all in Penrhyn granite and Bramley Fall stone, and these materials are also used for the quoins, &c. For so extensive a work, so small a "stone-field" is seldom seen. Staffordshire blue bricks are used for facing where the wing-walls join the main walls of the lock, at which points there is likely to be considerable friction and rubbing by vessels entering or leaving the dock. Just above the lock-gates double grooves are provided, for taking a 14-in. pile coffer-dam, should such be needed while effecting repairs to lock-gates. Near the before-mentioned culverts two low-level sewers, 4 ft. diameter, have been constructed beneath the lock, to meet the requirements of the Metropolitan Board of Works. These sewers will not be used at present, but they have been constructed in order to provide for future contingencies in connexion with the main drainage of the metropolis. A small portion of the works here, such as the penstock-chambers connected with the sewers, has been constructed in blue lias lime mortar. This small portion of the works is the only part where lime-mortar is used, and there is no lime-concrete whatever used, all concrete being made with Portland cement. The new entrance from the Thames, of which we have given some particulars, leads into a 9 acre basin (as large as the entire area of the St. Katharine Docks), serving as a sort of ante-chamber or vestibule to the great 90-acre dock. This great dock is 540 ft. wide for its entire length, with a minimum depth of 27 ft. below Trinity high-water mark.

One of the most interesting of the many features of note connected with these works is the fact that they furnish almost the first instance on record of any large dock-wall being made entirely of concrete. A considerable extent of the wall of the great dock is nearly completed. The aggregate length of walling will be 2½ miles. The wall will be 38 ft. 6 in. high from foundations to coping, 18 ft. thick at the base, and 7 ft. thick at the top, supported at intervals of 50 ft. by huge counterforts of the same material. The wall diminishes at the back by steps, and batters in front 2 ft. from bottom to top. The coping is also of concrete, neither brick nor stone entering into the construction of the wall. Iron "bollards," for attaching ships' cables and hawsers, are fixed at intervals of 100 ft. apart, being tied down by iron rods built into the counterforts. The concrete is composed of three bushels of cement to one cubic yard of gravel and sand. The portion of the wall completed is as fine a specimen of concrete work as was ever completed, and reflects great credit upon the contractors, Messrs. Lucas & Aird. The cost of the works in hand, under the present contract, which does not include lock-gates, machinery, sheds, &c., will be upwards of 520,000*l*.

The magnitude and importance of the extension will be more readily appreciated when we say that the works, which the contractors have undertaken to execute in three years, involve the excavation of three million cubic yards of earth, the whole of which has to be lifted an average height of 17 ft. Of this excavation, about two-thirds have been already done, partly by machinery, as hereafter detailed. Eighteen millions of gault bricks from the Medway (supplied by the Aylesford Pottery Company) are required for the tunnels, lock walls, culverts, &c.; and 45,000 tons of Portland cement (supplied by the Burham Company) will be used on the entire work. Fifty steam-engines are employed on the works every day, together with 1,800 men, 48 horses, 14 locomotives, and 600 contractors' railway-wagons; and there are twelve miles of temporary railway laid down. Six hundred tons of cement are used every week, and in the same period 3,000 tons of concrete are got in. The contractors are to be highly commended for their foresight and enterprise in recognising that to lay down plenty of good plant,—the best of its kind,—for such an extensive work as this, is the truest economy in the long run, as breakdowns and hindrances are avoided, and contingencies provided against. Messrs. Lucas & Aird have upwards of 100,000*l*. worth of plant in use on the works, most of which was made for the occasion. Amongst the plant which attracted most attention were three of Messrs. Clayton & Shuttleworth's 40-horse power expansive engines, each working a pair of 24 in. barrel-pumps, made by Messrs. Simpson, of Pimlico. Each of these pumps has a lift of 56 ft., and is capable of raising 2,000 gallons of water per minute, or 25,000 tons in twenty-four hours. The smoothness and ease with which these engines work, notwithstanding the power they exert, is marvellous. Since the Society of Engineers visited the works, in July last year, the pumps at the tunnel only have lifted 3,520,000 tons of water. Great as this quantity is, there is nothing like so much water as might have been expected, considering the close propinquity to the works in progress of the river and of the existing docks. Besides these there are four 18-in. pumps worked by 16-horse power engines, with an average lift of 38 ft. All these engines and pumps are bedded on concrete foundations.

One of the greatest attractions of the new works is the "steam-navvy," of which there are three in use. We believe it is the first time this ingenious machine has been used on so large a scale. It will excavate from 450 to 500 cubic yards per day. It somewhat resembles, and in fact is partly composed of, a large travelling steam-crane, revolving on a pivot, the projecting arm or boom of the crane being crossed at right-angles, or nearly so, by a beam which forms what may be likened to a handle of a punch-ladle, the bowl of the ladle, so to speak, being suspended from above by chains passing over pulleys at the top of the crane-arm in the usual way. The bowl of the ladle, if we may continue so to call it, is a huge scoop, capable of holding three-quarters of a ton of earth. The way in which it works is as follows:—The machine being already placed in a cutting, or against a cliff or bank of any sufficiently soft material, the scoop or bowl is lowered to the base of the cliff or bank, and by means of the chains is rapidly pulled up by the steam-engine, the arm or handle of the ladle being used to press the scoop or bowl (which has a somewhat sharp cutting-edge or lip) well against the perpendicular surface of the cliff or bank. As it rises it fills with earth, and when it has been pulled up to the required height, or, in other words, when it is full, the whole machine swerves on its pivot to right or left, and a door in the bottom of the scoop or ladle is instantly released, and the contents fall into a wagon below. This ingenious machine has been perfected by Mr. Dunbar, and is made by Messrs. Ruston & Proctor, of Lincoln. It will do as much work in a day as forty men, but requires a driver, stoker, and steersman to work it, besides seven or eight men to bring up empty trucks and arrange them in position as they are needed. About four scoopfuls of earth will fill a railway truck. The "steam navvy" makes a cutting about 30 ft. wide,—wide enough to allow of a line of trucks being placed on either side of it.

Another interesting adaptation of machinery to works of this kind was witnessed in the steam dredger. This is nothing more than the application of the ordinary floating or river dredger (the hull being, of course, replaced by travelling staging) to land excavation. The steam dredging machine has been here applied to land-work for the first time, at the suggestion of Mr. Aird, one of the contractors, for the machine used for a similar purpose on the Suez Canal works was somewhat different. This land dredging-machine has been constructed by Messrs. Hunter & English, who have made dredges their speciality. When in full work it is capable of excavating 4,000 cubic yards a week. It is a more cumbrous and expensive machine than the "steam navvy," and it is more liable to get out of order, but for certain work it possesses the advantage of not mixing the materials of the different strata in which it may be working. In the "steam navvy," as we hope we have made clear, the scoop is drawn up from bottom to top of the perpendicular face of a cutting, consequently the scoop will take up some of the material of each stratum which it scrapes or scoops. The steam-dredger, on the contrary, clears away the ground horizontally, and in the case under notice (where the top layer was of clay, beneath which was a layer of peat, and then a bed of gravel) it was used to scrape off the clay first, then the peat, and then the gravel to the extent desired, keeping each material distinct. The ground, Mr. Andros remarked, was all that could be desired for the purpose of the works. The top stratum of clay was available for puddle, the peaty soil served for raising the embankments, forming quays, and backing walls, while the fine bed of gravel,—a veritable mine of wealth,—afforded abundance of material for the immense quantity of concrete required, amounting to no less than 250,000 cubic yards. Indeed, but for this abundance of gravel the new dock works would probably never have been carried out, a dock wall of such magnitude and extent in brickwork being too costly. Among other machines in use is a large concrete-mixing machine, in which the materials are shot into large iron cylinders having a circular motion. Twenty-five turns of the cylinder suffice to thoroughly mix the concrete, when it is shot out on the spot where it is required, and then rammed. As the wall progresses the machine is moved farther forward.

Before leaving the works, Mr. Thomas Cargill, the president of the Society, proposed votes of thanks (1) to the London and St. Katharine Dock Company, and to Mr. A. M. Rendel, M.A., engineer-in-chief, for their kindness in permitting a visit to the works; (2) to Mr. A. C. Andros, resident engineer, and Mr. W. Colson, contractors' agent, for their kindness in conducting the visitors over the works, and giving so much information; and (3) to Messrs. Lucas & Aird, the contractors, for their permission to visit the works, and for their hospitality. Mr. Andros having acknowledged the compliment, the party returned to town shortly after six o'clock, highly satisfied with their arduous day's work.

THE ROMAN FORUM AGAIN.

IF we do not eventually arrive at definite conclusions in regard to the archæology of the Roman Forum, this will not be for want of writers writing about it. Only a few months since we noticed, as the most recent of a long train of disquisitions on the subject, Mr. Parker's valuable, though confused and rather eccentric study of the Forum (see *Builder* for October 28, 1876); last week his lecture on the same subject; and already another volume appeals for our recognition of conclusions in some respect opposed to his. In the preface to the latter book,* the author, Mr. Nicholls, remarks on what is also especially dwelt on by Mr. Parker, the different position in which the problems of the topography of the Forum have been placed by the excavations of late years; so that instead of the inquiry, Where shall we find such a monument? the question is more frequent, What is the monument the ruins of which have been found?—a question which, as he observes, is open to a far more certain and definite solution than the former one. The object of his work is, in his own words, "in the first place, to describe and identify the ruins which exist in the area of the Forum which has been cleared: this will occupy the first three chapters. The three following chapters are devoted to the discussion of subjects connected with the history of the Forum, but only indirectly illustrated by the late excavations, such as the site of the Comitium and the Curia, the history of the Rostra, and the topography of that side of the Forum which has not yet been disinterred. In the three remaining chapters, the attention of the reader is withdrawn from the Roman Forum itself to the Imperial Fora, the Sacra Via, the Velia, the Nova Via, and the gates of the Palatine or primeval Rome."

In his first chapter Mr. Nicholls proceeds to arrange the buildings at the upper or Capitoline end of the Forum, in regard to which he offers no contradiction, as may be supposed, of the now almost universally accepted positions of the Temples of Concord and the Tabularium; and having disposed of these, we trench on the much-vexed question of the two temples which are now generally admitted to be those of Saturn and Vespasian, but with strong opposition of opinion as to which is which. To our own thinking, the question is settled with, at least, a near approach to positive certainty; and Mr. Nicholls seems to be of much the same opinion. He brings forward the strong points in favour of the conclusion that the temple with its rear to the Tabularium, and facing to the end of the Forum, is that of Vespasian, and in doing so recapitulates the same arguments, sometimes in nearly the same words, which were stated in our remarks last year, referred to above; and lays particular stress on what we then remarked as a very strong point, viz., the clear and unmistakable statement of the *Monumentum Ancyranum* inscription, to the effect that the Basilica Julia stood between the temples of Castor and of Saturn, a description which is quite incorrect and unintelligible if we suppose the temple of Saturn to be the farthest of these two from the Basilica, instead of the nearest. We regret to see, however, that a little farther on (p. 43) the author drops into just the same arguing in a circle which other Roman archæologists have shown such a tendency to, and having quoted the *Monumentum Ancyranum* to prove the position of the temple of Saturn, as being that of one of the temples flanking the Basilica Julia, quotes the same passage again to prove the position of the Basilica Julia as being that which the temple of Saturn immediately adjoined. Mr. Nicholls, as we have observed, is by no means alone in this sort of thing; but as he is particular in insisting, in his preface, on the necessity of a knowledge of ancient literature in studying Roman remains, we are really inclined to go a step further, and suggest to him and other archæologists the necessity for more consideration of the simplest rules of logic, and a recognition of the fact that you cannot assume A to prove B, and then use B to prove A. The point is not of so much consequence in this case, as the position of the Basilica Julia is sufficiently fixed by other means, and can hardly be said to be a controverted point at all.

In the main, however, Mr. Nicholls's book appears to be carefully and systematically written, and states very fully and impartially the reasons for the various opinions which are discussed or supported. The book is accompanied by well-engraved plans of the present state and the supposed former state of the site of the Forum and its surroundings at various epochs; and also by views showing the supposed aspect of the Forum and its buildings as restored. These latter, however, are somewhat tame in style, and serve rather to explain the author's meaning than to give any vivid realisation of architectural effect. But these few drawbacks allowed for, the book is a very useful addition to the literature of the subject, the rather as it gives, in a small compass, a great deal of the evidence from ancient literature bearing upon the topography of Rome.

* The Forum Romanum: a topographical Study. By Francis Morgan Nicholls, M.A., F.S.A. London: Longmans & Co. Rome: Spithöver. 1877.

EXHIBITION AT NAPLES.

THE Exhibition of Antiquities here has been succeeded by a Fine-Art show. I would have sent you some account of the former, but the fact is, antiquities by the side of the national museum, or, as I knew it in former days, the *Real Museo Borbonico*, do not tell to advantage, especially in the face of some delicious additions that have been made since my long-ago visits; whereas modern Italian sculpture is so different to the *antique* that it bears with its undoubted beauty a sweet freshness, as of the flowers of a new year. Italy is undoubtedly entitled to the palm for sculpture in the modern art world. The Romans never equalled the highest class of Greek art, but the Italians have not their masters in any modern school. The eye is arrested at once on entering by an allegorical figure of delicate proportions, but with pinions of such a size, yet so easily disposed, that the human figure for once really looks made for wings. Near it is a much larger and somewhat ambitious group of two angels kissing in mid air, in which the artist has wisely avoided the flying attitude, and given a simple poise scarcely implying a necessity to overcome a gravity which does not exist. The enormous weight of these two figures is so easily disposed of that the effect is almost delusive. The effect is highly Miltonian; the drapery is as of thin cloud, in which stars are dimly seen; one figure leans from an elevation over the shoulder of the other that the lips may come in contact,—the positions are difficult, but remarkably well rendered; its price, 1,000*l.*, is none too much. One wishes, on seeing it, to be either poorer or richer, to be able to purchase or be out of the reach of temptation. There are numerous works of great merit,—among them a striking figure of Camila,—but they are of the usual class, and bear no comparison with the orginality of the two I have described. Some sweet subjects of children in various conditions of joy and grief are sure to be popular.

In the school of painting, Italy is not on a par with that of England; the tone, except in some large pictures quite out of our sizes, is merely good, and some pictures placed inside rooms cannot even be called that. The pose of the figure-subjects is easy, as it would be sure to be under Italian placing, but the execution is wanting. In the landscapes, after making every allowance for a more southern sun, the lights are too sudden; the red of the sunsets is too deep for reflected light, though very well for the sunset itself, hence the distant hills are brought too near. I have lately returned from viewing the most intense effects in Greece and Asia, but there was no colouring so sharp as that in some of these pictures. Vesuvius and the Apennines are, while I write, reflecting a ruddy sunset, and, having just come from the pictures, I feel clear in my remarks. There are a few good etchings, water-colours, and other works of art, and the exhibition is well worth a visit. I notice some etchings by an English hand, J. E. Bradley, of home views in England.

Naples.

Leonardo da Vinci's "Last Supper."—M. Viollet-le-Duc writes from Milan to the *Journal des Débats*:—"I have been distressed at my visit to Santa Maria delle Grazie to see the fresco by Leonardo da Vinci, of 'The Last Supper,' completely disfigured by restorations. The three apostles at the end of the table, to the right of Christ, have been entirely repainted. And then this fine painting is in its last stage of decay. The wall is incurably damp, and the plaster flakes off in small pieces, which gradually become larger. It is many years since I saw the Cenacolo, but from what remains, it appears to me that Morghen's engraving is singularly wanting in the greatness, action, and expression of the original."

THE CAXTON MEMORIALS AND THEIR ART TEACHINGS.

THE not-a-little remarkable exhibition of the work done in his day by William Caxton, the first English printer, has called forth, as it certainly should do, a very great amount of public and professional interest. Many are the comments that have been made upon it, and upon the wide-spread influence such exceptional work had in the world. It would, indeed, hardly be possible to overrate the importance and interest of it, or the vast influence it has had on the movement and progress of the world of humanity. Had there been no printing at all, what now would have been the state and position of the world? What, if there were no printed books, and nought but MS. copies of original writings? Few in number they must need have been, and far too costly for the many ever to get at. It is impossible nowadays even to imagine such a state of things. Much, as we say, has been written about all this, but there is wide room for more; and there is one item in "Printing," to use a general term, which may well interest the artist and the architect, and that is the strictly artistic character of the work of the earliest and first printers, looking, as so much of it does, like hand-work. Of the marvellous mechanism, and power of divided and duly-apportioned labour, which the modern system of printing exhibits, no one needs even to be so much as told; and most surely, could but Caxton rise from his quiet grave to look at it all, he would and could never believe his own eyesight. It is little short of a magical process the result of a modern printing-press in full work! It is the very triumph of mechanical ingenuity and the power of mechanism! And there is yet more of it in the air to come.

But in one thing old Caxton, the first printer, and with him the three famous Germans, Guttenberg, Fust, and Schoeffer, of Mentz, did, which,—with all our wonderful means and appliances,—we fail to do, and that simply is, to compel the readers of, and hard-lookers at, a printed page to look at it again and again as *artists'* work, as, indeed, they must look at, and do look at, and regard, a finely-written MS. We certainly, as we say, do not do this; but Caxton, and those who worked with him, most certainly did. To many who have not regarded the subject in this light, this may seem a matter difficult at first of comprehension; but a visit to the Caxton show at South Kensington may convince them of its truth; and if that does not, then compare, side by side, a well-written MS., and early-printed book, and a modern daintily-printed page in a quite new book will. This will soon evidence it, and to those even who may be a little unwilling to acknowledge it. What is the cause of this artistic impress? we may well ask; and what the cause of its absence? A wide question, indeed, and, may be, like many other mysteries, hard to answer; but a cause or causes there must be, and a few words here may be useful, if not convincing. To solve the problem may be impossible at present, but the study of Caxton's work will help.

But few readers will need to be urged to visit the Caxton memorials, but to such of them as go to study a past state of things, we would specially point to this characteristic of the many open pages before them; for the more these printed lines are looked at the more difficult is it to see how the individual *letters* of them were wrought. It may be called to mind, in the first place, that these early printed books are copies of *written* books, and that the effort made by the printer, or artist type-cutter, was to imitate hand-writing. We have now before us a MS., of course written by hand, just indeed as a modern page of MS. is nowadays written, and probably as without a thought of its being anything more or less than ordinary and everyday writing, and consequently with nothing special about it. It is all but, as one would think, reproduced in a printed page by the side of it. Both the MS. and the printing are very plain, simple examples of either kind of work, and do not contain anything out of the usual and common way; yet is there an impress in the printed page of the *artistic* handwriting of the MS.

Many doubtless will consider this the simple, and perhaps necessary result of the fact of the direct copyism; but most surely there must be more than this, for a modern printed "circular," directly imitated from a MS., does not look like genuine handwork and writing, and no one ever takes it for such. But this is not all, for the same impression of handwork is to be seen in

work which does not profess to be a copy of handwriting at all, as in the large initial letters, and in the title-pages. A something is doubtless due to the peculiar quality and texture of the paper, and to the kind of ink used, and to the care with which the work was done, and the very time occupied in the doing of it. Important and not a little influential items these, and to be largely taken into account; but the main strength of the work would seem to lie, and, indeed, must do so, in the artistic skill and accuracy of eye, and keen perception of the type-cutter, whether such type be of wood or of metal; in short, the type-cutters in Caxton's and Faust's day must have been artists and art-workmen, and must have keenly felt the beauty of the work they were doing, and must have worked both with their brains and hands instinctively as artists in the production of original work.

There is a thought here which may occur to some, and which seems to us to deserve special consideration nowadays, in these times of mechanical production: it is the peculiar, and hard-to-be-defined impression made on the mind unconsciously by autographic work of any kind, by individualised handwriting. A collection of letters, for example, by some famous man of past days, written by himself, though they convey no more than such letters would do if read in a printed page, yet seem to do far more. They take you into his presence, all but, and you see him pen them. Copies of them, however near, do not do this. An interest, too, would seem to lie in his "signature," his "name" at the end of each one, and what does *it* not convey? It would be hard indeed to define this, and to measure it mathematically; but it is so, and how much would the world give to look but for a moment at the autographic work, at the handwriting, of but a few more of those who have for good and all passed for ever away! How glad should we be to see their written work, even but their names, in antique ink.

We might go into almost any amount of detail, and refer to individual pages in the Caxton show of printers' work, but it will well speak for itself. Each item, as studied chronologically, will evidence what is here urged, and will show to the student more and more impressively how much is due to individuality of hand, and to "personality" in the production of artistic work. Mere mechanical processes, however skilfully worked, will not do this, and cannot do it. We might point to many a page, and every individual letter, but need hardly do so, from the simple fact of their number, and the not well knowing what to pass by, and what to specially note, there being so much that is noteworthy, and all of it telling the same tale, and reading the same impressive and instructive lesson. The very curious student of this work of Caxton's early printing efforts should have with him a fragment or page of MS., or if not that, a modern woodcut map containing lettering in the names of places, &c., for it is curious to note that woodcut lettering, thus done, is much nearer the old printer's efforts, than the more regular work in an ordinary printed page from metal types.

We may here remind those who will thus look on those printed pages as *art* work, that they will lose much by not viewing them chronologically, and thus to mark the changes that took place as the machinery of printing got to be more and more comprehensive, and powerful, and perfect. Wynken de Worde followed Caxton, and he in time was followed by others, down to our own day; and step by step we may thus see that, as the *machine* did more and more, there was less and less to be done by *hand*. No one can or dares to complain of this; but where there is a gain, Nature would seem always to say, there shall then be a loss. In the fourteenth and fifteenth centuries there were produced magnificent MSS. magnificently written, now to be seen only, a page here and there, in a tightly-fitting glass case. Nowadays, there are most surely none such; but, in the place of them, millions of printed books and pages, the work of the all-but living machine. In the Caxton display the very commencement of this passing away of the necessity of the art-power of the hand, and its all but final disappearance under the machine, may be curiously noted, and some little time and thought may be spent in balancing the loss and gain, for most certainly there is both a loss and a gain. A wide question, indeed, opens out here in looking through this printers' show, for it is not in such work alone that the *principle* involved is concerned; but it is somewhat curious that it finds illustration in it in so marked and emphatic a degree.

And among many there is another consideration which strikes us as being well worth the consideration of those concerned with the designing and practical carrying out of buildings; and it is the lessons these printed pages afford for the more artistic "lettering" on them, and the wider extension of the idea of it. It is but rarely and exceptionally that a building has any thing *written* on it, any inscription, or motto, or date; and, with the exception of names over shop-windows, miles of streetways may be passed without noting a word but the names at the corners of the streets themselves. This is perhaps a little remarkable, and hard to be accounted for; for in the older architecture the rule would seem to have been to miss no opportunity of writing on them, and all over them. Witness the hieroglyphic writing of Egypt,—walls, columns, doorways, inside and outside, all covered with inscriptions and writing, telling of many things, we yet hardly know how much and how fully. The Assyrian, again, what did he not do? The very robes of his gorgeous and flowing costume were covered, oddly enough, with that same handwriting which made of his palaces open books. And ancient Mexico, too, had its own writing, mysterious as it yet is, on its temple walls, and gateways of entrance into them. And even farther back in time than those, and by far ruder workmen, are the very rough rock surfaces found covered with inscriptions, in forgotten languages! There is much, therefore, for the architect and the builder in this Caxton show of printing, and we would but hope that good use may be made of it.

THE HOME OF PHILIBERT DE L'ORME.

SPEAKING in these columns not many months ago of the new Boulevard Henri Quatre at Paris, we had occasion to mention the home of Philibert de l'Orme, the famous French architect. Now that the Boulevard is open as a public thoroughfare, and every vestige of the old Hôtel de Lesdiguières has disappeared,* it is not a little interesting to observe still existing at the corner of the Rue de la Cerisaie, a considerable portion of the house that De l'Orme had built for himself, and in which he died, May 30th, 1577.†

Not that the ordinary passer-by could point it out, wedged in as it is between two more modern constructions; alone is it recognisable by the dormer-window and some few remains of cornice, which immediately recall the original plan of the building as shown in De l'Orme's "*Livre d'Architecture*."‡ There, in the eighth book of the first volume (alas! he died ere the record could be published) after speaking of several houses he had constructed, he proceeds to show us "how the learned and expert architect can erect gracefully, and at little cost, a house which shall be as well built as those on which much money has been laid out." He then continues with a minute description of his own dwelling, aided by several illustrations and plans.§ There is a façade on the garden, one on the court-yard, and one on the street. From this description we learn that the house, at the time he wrote (1567), was not completed, the façade on the Rue de la Cerisaie was not built," which, remarks he, "I should much like to have continued, and would have done so long ago, had not God taken from me my very sovereign prince and good master, the late King Henry [II.] whose soul now rests in heaven." De l'Orme promises, however, that in the second volume, "*Dieu aydant*," he will amply describe "the face of the said *corps d'hostel*," but death unhappily carried off the great architect before the promised treat could appear; well had he remarked respecting this continuation of his work, that he would alone carry it out, "*Dieu aydant*."

We have already referred to the strong religious sentiment that reigns throughout the writer's work,‖ and in this doubt whether he will ever finish his task we again find expressed this holy fervour.

The following is a translation of the passage in De l'Orme's "Livre d'Architecture" which treats of his own house:—

"Since I am speaking of this subject, I will show you the other face of the house, which is on the garden side. Thus, I have made it in the middle, of a round form, a tower, the first story of which serves as a chapel, accompanied by a gallery with windows whose height is not in proportion to their breadth, but I have made them large to give more *pleasure* to the said gallery, which is graceful and of great beauty, and even more finished than the plan would imply. On the second story of the said tower is a very strong *cabinet*, built in freestone. On each side are two other *cabinets* and terraces, and in the rear is the principal *corps d'hostel*; the whole, as regards the windows, the cornices, and attics, built of good materials, with great conveniences in the way of cellars and other places; letting you know that the whole has been done as for myself, being my own house, such as you see it in the former and next plates.

But it must be remembered that this house is not yet accompanied by a *corps d'hostel*, which I had deliberated on having, facing the Rue de la Cerisaie, near the Célestins, at Paris, which I desired to build, and would have done so long ago had not God taken from me my very sovereign prince and good master the late King Henry [II.], whose soul now rests with God. I will present you, then, with the façade of the *corps d'hostel*, in order that you may better understand its disposition, as also the enrichments which can be given it, without much work or grand order of columns with their ornaments. Being on this subject, I would willingly show you at once the arrangements of the interior as they will be; but I put this aside; my deliberation tends to no end, if not to show you, after the gates, the windows and attics, as I will do, God aiding me, and will reserve the rest for the second volume of our Architecture, in which I will give you not only this house which I have made for myself at Paris, but several others of different sorts, for great and small, with their plans, which will be necessary to understand them."

With all the knowledge, however, that De l'Orme undoubtedly possessed, the garden façade of his house is by no means free from something of the ridiculous, though the paved and arcaded court was a happy introduction.

Paris.

"SOUTH KENSINGTON."

UNDER this title Mr. Edgar Bowring, C.B., contributes an article to the June number of *The Nineteenth Century*, which, by accident, did not come under our notice until now. This article contains an incorrect statement, in which we are so much interested that we are compelled to allude to it. The writer says,—

"The choice of a general name for the new district of London thus opened up was a matter of some importance, and the happy title of South Kensington was at length approved by the Prince. In order to render the general scheme unpopular, the nickname of the 'Brompton Boilers' was applied to the temporary building at first erected for the Science and Art Department's Museum, Brompton being supposed to be unfashionable, unhealthy, and objectionable in other respects. But, in truth, no part of the property is in Brompton,—Westminster and Kensington possessing between them, as above indicated, the enviable privilege of taxing the whole of it."

Mr. Bowring is not aware that Kensington has the "privilege" of taxing all Brompton, and this has led him to a wrong statement. It is with an earlier part of the paragraph, however, with which we are concerned. The term "Brompton Boilers" was *not* applied to the temporary Museum at Brompton "in order to render the general scheme unpopular." The term was applied by the conductor of this journal, as our esteemed friend of long standing, the writer of the article, and many other persons, know perfectly well, and it was applied while the building was in progress simply and merely to obtain some mitigation of its ugliness.* We showed that it would take the shape when completed of a three-fold monster boiler, and the likeness was so obvious eventually that the designation stuck to it. It has been our aim to assist the "general scheme" in every possible way, from the time when the Royal Commissioners bought a portion of the Harrington Estate, in Old Brompton, 1852, and when we wrote urging that "the conversion of the Brompton groves, with all their fine old

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* See *Builder*, Sept. 9th, 1876.

† Not 1570 as misprinted in *Builder* for July 7th, 1877.

‡ "Le premier Tome de l'Architecture de Philibert de l'Orme." Paris, 1568. Folio. Full of interesting matter to the student and professional man.

§ These have been reproduced by Callet in his "Architectes Français du Seizième Siècle." Paris, 1842. 4to.

‖ See *Builder*, July 7th, 1877.

* See vol. xiv. (1856), pp. 213, 282, &c.

poplar, elm, walnut, chestnut, beech, and orchard trees into classical groves of learning in art and science, with a surrounding area of pleasure gardens for the people, would be a boon,"* up to the present moment; and it is therefore that we protest, in the strongest possible way, against the statement to which we have alluded.

WANDERINGS AND QUESTIONINGS IN ARCHITECTURE AND ART.

ARCHITECTURAL CHIAROSCURO.†

A STUDY of architectural chiaroscuro shows the value of plain wall in a façade, and that many magnificent buildings would have been more powerful if their active features had been more concentrated, and suggests that it is as true in architecture as in painting or poetry, that half is often greater than the whole. The eye instinctively looks for a mass of plain wall at each extremity of a series of thickly-strewed openings, as it looks for the abutments of a great arch or bridge, or for the rocks on either side of a glen. In buildings of great length it is often to the eye like the shadow of a great rock in a weary land to the traveller. Some otherwise fine buildings,—most of the club-houses, for example,—would be greatly improved by the addition of a few feet of flanking pier on either hand. So would Burlington House, and even Inigo Jones's Banqueting-house. Even some of the palaces on the Grand Canal at Venice are too equally divided into windows and piers, and lack plain wall at their extremities, which may be said of the Library of St. Mark and School of San Rocco. The river front of the New Houses of Parliament would have been grander with half the number of under windows, and more plain wall at each end. Its equality of division, I think, renders this fine front inferior in power to some of the more private façades of the same building, some of which are very broad and grand. For want of plain wall, the royal residence, Balmoral Castle, has little of the characteristic grandeur of the castle. Its architect might have taken a lesson in the art of giving dignity to his work from some of the humblest of our old English half-timbered houses, or ancient parish churches, some of which look really noble, and not one of them mean.

This plain wall is the desideratum of the architecture of our great trading streets, which would exhibit a very superior character were every alternate shop walled up. But the securing of 5 ft. or 6 ft. of wall between each front would have gone far to give the needful repose,—which would have caused no inconvenience, as so much glass cannot be necessary.

But where a due expanse of unpierced wall is given it is often neutralised by wrong treatment. Such is the case at the Bank of England, the National Gallery, Edinburgh, and at the Temple of Industrial Art, Munich, by the pilasters to the wing walls, which are worse than useless, as they produce a series of narrow breadth-destroying shadows. The same objection applies to entire or three-quarter columns against a blank wall: they cut up, and destroy repose.

There are some important species of town buildings, in which the architect is greatly trammelled by utilitarian considerations; but I believe that in those in which he is most trammelled, or least allowed to sacrifice to beauty, he may, by due thought, obtain a broader distribution of light and shade than we usually see in our streets; where, as in the soberest species of literature, some gleam of imagination and feeling should here and there break out, something to satisfy the quenchless thirst of the human mind for the beautiful. In the costliest sites of London there was no need of the monotony so frequently exhibited by the great blocks of commercial buildings. Many of these are very ornate; but a square or parallelopiped block of building, divided into tiers of equally paced windows and piers, and void of the charms of composition and chiaroscuro, is only architecture by courtesy.

But it was not necessary they should be so. I could point to hosts of such buildings in London where there was no reason why more variety was not displayed. If projecting features could not have been had, deep central recesses might have been made the width of the staircase, which is better adapted to the exigencies of our climate, attention to which it is remarkable, whether it be a warm or a cold climate, is favourable to chiaroscuro. Most private houses, and many public ones, would be greatly improved in respect of light and shade by the widening and deepening of their entrance-doors, while it would give them a more hospitable look, as nothing looks less so or meaner than a narrow doorway. It is narrow doorways and monotonous division into still narrower windows that, more than the want of ornament, demeans the lower classes of streets, a defect which the humblest cottage in the country escapes, and which the old English cottages and mansions avoided by presenting broad masses either of mullioned windows or walls. In some Elizabethan and Tudor mansions the windows, grouped or bayed, are commanding and unifying objects eminently favourable to breadth. And even in instances where they stretch entirely across the front from end to end, with massive wall below and above, they are not unpleasing. Some houses on the Continent are entitled to equal praise. I refer to those in which the lower story is recessed behind an arcade of broad arches, and the windows grouped on the story above. The house of Francis I., at Paris, is a palatial example of this arrangement.

Unless restrained by the imperative exigencies of the building, as may sometimes be the case, or by the wish to express its purpose, I should advise, in all cases, the grouping of the windows,—bringing them into a large central and two or more smaller side groups; or so condensing or approximating them as to give room for a larger mass of wall at each end.

From the monotony of the alternation of narrow equal piers and windows from end to end of a long façade, I believe a building presenting either all one or all the other element,—unbroken wall or uninterrupted glass,—would be a relief to the eye. Either of these gives a sort of breadth. Indeed, buildings showing unpierced masonry, and which are considered almost without the pale of architecture, possess a power and grandeur that nine-tenths of architectural works are void of. Such are the old feudal castles and city-gate towers. Even prisons and markets often look grand from the same cause. In all such buildings the eye is drawn to the great mass of masonry, not divided, but only relieved by the small windows or loopholes.

In a similar way is the eye affected in such erections as the Crystal Palace, Sydenham, by the great mass of unbroken shade, or dark glass, which strikes as one vast object from being one material, the iron columns not distracting the attention any more than the mullions in a Gothic window. This quality, unity and power, is what gave the Crystal Palace of 1851 in Hyde Park its architectural interest and value.

> "The earth hath bubbles as the water hath,
> And this was of them."

But it was a *great* bubble. There was a greatness of manner about it that touched the imagination more than a mile of the loftiest blocks of building, with tier upon tier of equally paced windows and piers, would do. Such crystal fronts as the Watermen's Hall and the Town-hall at Ghent may be defended on the same grounds.

Some buildings are imposing, and strike us forcibly as a whole from appearing mainly as one great mass of sculptural decoration. Of this the Castle of Heidelberg and several French Gothic cathedrals are examples.

Where equal division into windows and piers is imperative, something may be done to prevent or mitigate the disagreeable effect. Extraordinary richness of dressing may so increase the power of the windows as to render the intervening space of the pier powerless to attract the eye from it,—as in Sir C. Barry's Bridgewater House. But spottiness, the opposite of breadth, may be in some measure avoided when, as in later Gothic façades, the tracery of the window is continued over the whole front. Pierce a smooth wall with square or oblong openings, and you have what are opprobiously called hole-in-the-wall windows; round the heads, insert tracery, and mould the jambs, and they are only more ornamental holes; but carry the tracery with which they are filled in all over the wall, and unite the windows with water-tables, string courses, and other horizontal bands, and they cease to be holes in the wall, and the building has a less spotty appearance. The Ducal Palace at Venice is broad from the panelling of its surface, which unites the windows, and supplies a middle tint. In many French buildings a good and uniting effect is produced by forming each pier into a large panel, about the size of the window of which the palace at Versailles is a good example. Timber buildings generally, from the windows being united each way through their complex frame-work, exhibit no lack of breadth.

The compacter the general form of a building the broader it will come in a general view—a remark condemnatory of some of the Mediæval cathedrals, whose long, far-projecting transepts are opposed to breadth, since they present distinct masses of light and also of shadow which cannot be respectively united. A review of various detached edifices will show that the adoption of a hexagonal, octagonal, or cylindrical plan is assisting to breadth of light and shade, since you see at least three sides with high light, half light, and dark at once. As to the rotunda no other form can be so broad or bear so well to be divided into a multitude of openings, or surrounded by columns, as in every view of it the equal spaces grow narrower each way from the centre. The form of building most of all susceptive of a broad effect of light and shade is the rotunda, crowned by a hemispherical dome, as on some point of the latter the sun's rays must fall perpendicularly, and give the highest possible light, decreasing in a line down the rotunda, and gradually dying away in every direction into deepest shade. Concave-sided buildings, such as represented by Wren's unexecuted design for St. Paul's, are also susceptive of a broad effect of light and shade.

What I have said of the rotunda will show that the round column is superior to the square or the octagonal one, or any other supporting form; to it we owe the brilliant effect sometimes produced by the level beams of the setting sun on a colonnade, by a strong line of light on each column, contrasted with the prevailing darkness.

Before I conclude, there is an interesting species of structure I wish to notice,—the triumphal arch of the Romans,—as an extreme instance of the antagonism between utility and architecture. Though favourable to beauty of outline and sculptural decoration, the triumphal arch is adverse to chiaroscuro, the thoroughfare or opening through which the ivory chariots, the golden eagles, the captives, and the pictured cities of the victorious procession were to pass, failing to produce the shadow essential to beauty and power as architecture. This defect (as the ancient purpose had ceased in modern times) their modern imitators in London and Paris had an opportunity of remedying, and gloriously improving on the originals as works of art, by using them for some monumental purpose which would permit the erection of a wall across the passage; in which form they would have served the sheltering of a statue or statues.

Chiaroscuro applies not only to exteriors, but to interiors, where the quality of breadth is dependent on the mode of lighting. The broadest way of bringing in light is from above, and in as few openings as possible; a lesson which I think is taught by the crypts of our cathedrals, in which there is often a grander architectural scene than is found above in nave or aisle.

I have referred in the foregoing remarks to many instructive examples of chiaroscuro. There is one class of examples I must not omit,—those of the infinite nature around us whose works are always broad. A residence among mountains convinces me that there is, indeed, something calculated to expand the mental vision and imagination of the architect among the grand scenes and bold and striking objects of nature, and render him less satisfied with tameness and weakness in design. A contemplation and study of the chains and groups of noble domes presented by the everlasting hills would not only intensify his feelings for grandeur and power in architecture, but it would fill him with boldness of invention; and, suggesting the wide field there still exists for beauty and originality in art, would weaken his reverence for precedent.

Chiaroscuro applies to literature as well as to art; and its importance and difficulty must be felt by every writer of poetry or essays, sermons or speeches, in which the expression of the individual ideas is comparatively easy. It is the general arrangement with regard to a broad distribution of the lights and shadows of the subject, if it have any, or of the different elements of which the piece is composed, that is less easy to manage. Without this it can have but little power over the mind of the hearer or reader. The principle is best obeyed in the greatest works,—in epic and dramatic poems, and the higher creations of the imagination,—in tragedy the shade predominates, in comedy the lights. In "Romeo and Juliet," for example,

* Vol. x., p. 677, &c.
† Continued from p. 708, *ante*.

the tender and passionate are brought up against the painful distress of the tragical termination. In the sacred poem of "Job," the light in the beginning contrasts with the deep gloom of the sudden misfortunes of the patriarch; and this again gradually gives way to the brightening conclusion of his latter end.

But the principle must be attended to in all works aiming at any persuasive effect. Even now I am trying to obey it in the composition of this essay, which will have the greater effect the more I can group ideas of the same kind together. Nay, a note cannot be written as it ought to be without some attention being paid to it,—a fact which was alluded to by some one who, it is said, apologised for writing a long letter by saying he had not time to write a short one.

Chiaroscuro belongs to literature because it belongs to life, of which literature is an exponent; and is seen in the mixture of good and evil, pleasure and pain, joy and sorrow, in the world.

SAMUEL HUGGINS.

THE TOMBS AND CATACOMBS OF ANCIENT ROME.

MR. J. H. PARKER delivered the last of three lectures on "Ancient Rome," in aid of the Roman Exploration Fund, on the 12th inst., in the meeting-room of the Institute of Architects, Conduit-street. Taking for his subject "The Tombs in and near Rome, and Catacombs," he said:—

The number and variety of Roman tombs is so enormous, that it would be preposterous to attempt to give any general account of them in the compass of a lecture; all that I propose to do is to point out some of the most interesting and important tombs that remain visible within the present wall of Rome and in the immediate neighbourhood. We should first bear in mind how extremely useful tombs are for archæological objects. For the history of architecture they are very valuable, as they are usually dated beyond dispute by the inscriptions upon them, although, unfortunately, in Rome these inscriptions have almost always been carried away into museums, and arranged either to serve some purpose, or sometimes apparently almost by accident, and in any case they are deprived of more than half their value by not being left in their original places. The effigies and the sarcophagi, or stone coffins, are also all carried away in the same manner, and of late even the fresco pictures on the walls are now carried away into museums and half spoiled. Another great use of these tombs, within the present wall of Rome, is to show the exact limits of the city. It is well known that no interment was permitted to be made within the city, and yet there are many tombs within the present city, and almost in the centre of it. The explanation of this is, that in the time of the Emperor Aurelian, towards the end of the third century, the boundary of the old city was enlarged to the outer wall, on which he built a more lofty and secure wall upon the old earthworks, and that which had formerly been the *finis*, or limit of the suburbs, became the boundary of the city. The tomb which is commonly cited as being the heart of the city is that of Bibulus, the contemporary of Julius Cæsar, which stands close to the north-east corner of the Capitoline Hill, in what is now the Via di Marforio; but some excavations which were made for me in that street, a little further to the south showed that the wall of the city and the gate were about 200 yards to the south of this tomb, and that there had been a wide and deep foss between the gate and the tomb (this was ascertained by examining the cellars of the houses). The tomb then stood on the outer bank of the fortifications of the second city, adopted by Servius Tullius, and forming part also of the third city. The tomb stood originally detached, and had inscriptions on all sides of it, one of which is now visible in the street, another is partially visible. Nearly opposite to this, but rather to the north-west of it, are slight and miserable remains of the great tomb of the Gens Claudia. The next to which I will call your attention is one of the first century, believed to be that of the great Lateran family, on the western bank of their fortress and palace (which was probably on the Celiolum); this tomb is not in the city, but on the outer bank of the great foss, between the east end of the Cœlian Hill and the Lateran, now almost filled up to the level, chiefly within the last five years, to get rid of the earth brought from the excavations in other parts. On the inner bank, and just outside of the wall of the city (but inside of the boundary line and of the foss), is another tomb of the first century, now under the modern road that goes from the old fortress over the Santi Quattro Coronati to the Lateran. The celebrated tomb of the Scipios belongs to an earlier period; it was the burial-place of that great family for many centuries, beginning about 300 years before the Christian era, and is very much of the same character as a catacomb. There are a number of *cubicula*, or small-vaulted chambers, in each of which was the sarcophagus of some great member of the family, connected by narrow subterranean passages, with stone coffins on either side, but in general with the end turned towards the passage, and not lying horizontally in the walls, as was usual in the catacombs. This is on the first mile of the Via Appia, in the first Regio of Augustus, between the Porta Capena and the Porta Appia. A little further to the south, on the same line, are three large tombs full of *columbaria*, or pigeon-*holes*, for the cinerary urns of those whose bodies had been burnt. These are of later date than that of the Scipios, who would not allow the bodies of their family to be burnt; the practice began after their time, as they were a very ancient family of Etruscan origin. There are three of these great tombs, commonly called the *columbaria*, or pigeon-*houses*, in the same large vineyard of Signor Codini. One of them was for the "servants of the Cæsars," or "officers of Cæsar's household," and among the very numerous inscriptions are the names of several persons mentioned by St. Paul. An excellent account of these has been given by Professor Lightfoot, of Cambridge. The other two belonged to burial clubs. A little to the east of this, in the same vineyard as that of the Scipios, is another very remarkable tomb, the most perfect that has been preserved anywhere; it was most carefully excavated by the Marquis Campana about 1850, and each object scrupulously left in its place. It is known by the name of Hylas, because his name is visible in mosaic letters over the steps, and he and his wife were keepers of it, but for a burial club only. Just outside of the Porta Maggiore, the great eastern gate of Rome, between the two roads that meet there, is the curious tomb of the baker Eurysaces and his wife Aristia; he was the contractor for the supply of bread to the army in the time of Julius Cæsar and Augustus, and was so proud of his trade, that he had his tomb made out of a number of his stone kneading troughs, and on the corners had sculptures representing the whole art and mystery of making bread; at the east end were the effigies of himself and his wife. This tomb had been buried for many centuries in one of the bastions of the gate of Honorius, A.D. 400, the interior of which was earth only, the objects of these bastions or towers being to place a balista on one and a catapult on the other. The tomb which stood ready was used as a part of the filling-up of the tower, and remained entirely concealed and unknown until 1833, when the Municipality determined to re-open the old gate of Claudius of A.D. 50, which was blocked up and concealed by the fortications of Honorius. Unfortunately the effigies were built up in a wall on the other side of the road instead of being replaced. (This error might easily be rectified: I have little doubt that I could get leave to do it if I could find the money.) The next to which I will call your attention is the mausoleum of St. Helena, about three miles from Rome, a lofty circular building, which had a vault of earthenware pots, as is shown by the remains. The interior was a chapel at the entrance to a catacomb, but it has long been in ruins, and a modern chapel has been built in it. The mausoleum and baptistery of Constantia, the daughter of Constantine, and granddaughter of St. Helena, has been more fortunate, and is nearly perfect, and with an aisle round it, on the vault of which are fine mosaic pictures of the fourth century. The twin-shafts, as they are called, or coupled columns, are believed to be the earliest instance of this fashion, which was largely followed, especially in cloister.

Returning to the Via Appia, but outside the walls, we have the poor remains of a tomb of the Emperor Geta. All that now exists is a square mass, with a modern cottage built upon it. Near to this, but in the meadows below, on the bank of the small river Almo, is the remarkable structure of the beautiful brickwork of the first century, which is usually called a tomb, but perhaps was not really so. It goes by the name of Deo Redicolo, and is supposed to have been erected long afterwards to commemorate the spot from which Hannibal returned. The name of "Redicolo," or returning, is given to the meadow in which the building stands. About a mile beyond this, and visible from it, is the great tomb of Cæcilia Metella, one of the landmarks of that part of the country, being on the edge of a promontory, and standing very high. It is an enormous circular building, with a small aperture in the centre, in which the sarcophagus was placed, the walls being 30 ft. thick. The commanding situation, and the massive strength of this great mausoleum, made the Mediæval family of the Gaetani take possession of it as a keep of a great fortress of their time, at the end of the thirteenth century, and they also built a small chapel very much in the fashion of the English Gothic of that period. Cæcilia Metella was the wife of the rich Crassus, one of the triumvirate with Julius Cæsar, and the date of the tomb must therefore be about fifty years before the Christian era. Another tomb which had excited considerable attention formerly, but is now so much destroyed that it is almost forgotten, is that of the Naso family, to which the poet Ovid belonged, and which used to be called the tomb of Ovid. It was very richly decorated, and an admirable series of engravings of the pictures was made by Santi-Bartoli, one of the best artists of his or any other age, but these frescoes have entirely disappeared, perhaps were sold. The tomb is on the bank of the Tiber, about three miles from Rome, on the road to Prima Porta. Another very conspicuous tomb, on the road to Veii, is usually miscalled the tomb of Nero. It is not of his time, but it is a conspicuous object, and is well known as a landmark. Another fine imperial mausoleum, which is a conspicuous object in the neighbourhood of Rome, and a very picturesque one, is that of the Emperor Gordianus, intended to have been the imperial mausoleum for his family, but they were all cut off at a distance, and this mausoleum was perhaps never completed, and was long much neglected. It is about three miles from Rome, on the Via Prænestina, and is called Torre de' Scavi.

The very remarkable discovery made in the Exquiliæ by the Italian company, who made such enormous excavations there, is the tomb of Statilius Taurus, the same person who built the first stone amphitheatre in the time of Sylla the dictator. He built his own tomb, and it was occupied by his family for many generations, as was shown by the numerous inscriptions found in it. Unfortunately these are all carried away to the museums, and even the very remarkable pictures on the walls are all carried away. If there were more persons of sense and taste to direct these things, the example set by the Marquis Campana would always be followed, and everything would be left in its place. Put a lock on the door, and charge a small fee for seeing it: this would pay much better than selling all the objects to be added to the superabundant quantities already supplied to the museums, all of which have more than they can show properly already. The original series of frescoes in this tomb represented the old legendary history of Rome, and seemed to fit more exactly the Æneid of Virgil than any other author. Virgil himself was living at the time they were painted, and it is extremely probable that he was a friend of Statilius Taurus, and gave instructions for the paintings according to his own ideas. I was fortunate enough to be able to secure a set of photographs of these interesting pictures before they were removed; when they are once taken off the walls no one can tell what tricks are played with them. The Roman artists of the present day are extremely clever in what they call restoring old pictures, but it is obvious that the restoration is a picture of the nineteenth century, not of the first. The frescoes in the upper part of the tomb, and on the vault, are of the time of Trajan, when the tomb was much enlarged; they are good pictures, but have not the vigour of the old ones. There is one figure in the early set, a shepherd with his sheep, which is said by good judges to be as fine art as can be seen anywhere. Another tomb, excavated some years since in the garden of the villa Pamphili Doria, about a mile outside of the Porta S. Pancratia on the Janiculum, has also a very fine series of fresco paintings of the time of Augustus, not quite so vigorous as those of the time of Sylla, but more highly finished and equally valuable; they seem to represent the villa of that day, with its gardens and menagerie; the beasts and birds are beautifully drawn. It is known that great Roman families frequently had a menagerie in their villas at that period.

The Catacombs.—There are few subjects on which more extreme opinions are entertained on both sides than the catacombs of Rome. An archæologist has nothing to do with any theological question, but the catacombs belong really to archæology more than to theology. The question of the dates of their construction, and of the fresco pictures, are questions of fact not of theory, and must be decided like other such questions by the principle of comparison. Persons who have studied the history of the art of drawing can see the date of a picture at a glance, just as one accustomed to the study of architectural history can see the date of a building. There is no doubt that the catacombs were the general burial-places of Rome for three or four centuries, for all those who had not family tombs by the side of the roads. All the space allowed for tombs on the roads had been occupied during the seven hundred years from the foundation of Rome to the Christian era, which is also the beginning of the Empire, and it is clear that some of the catacombs are of the first century, as is shown by the construction of the walls and the architectural details, where any can be found. This is especially the case with the very large and important one of Prætextatus, where some of the brick walls are distinctly of the time of Nero (there is no mistaking the long thin bricks of his time, which are found in all the buildings known to be of that period, and in no others). They continued to be used as burial-places until the sixth century, in the seventh they were so much damaged in the siege of Rome by the Lombards, that the ecclesiastical historian says "they annihilated the catacombs." After that time, when Charles the Great came to Rome, at the end of the eighth and the beginning of the ninth century, there was a general revival of the building of new churches and restoring of old ones; and it was the same in the catacombs, great restorations were made at that time, but no new ones were made. They were so far restored as was necessary to encourage pilgrimages to them in the ninth century (and the same has been done again in the nineteenth!). The most remarkable buildings connected with them are the chapels at the entrances to them, for the burial-service. At first these were underground, but close to the entrance. After "the peace of the Church" had been declared by Constantine, they were built above ground, near the entrances, of which there are many remains more or less perfect, especially at that of Prætextatus. There were several ways into this very extensive catacomb, one of them seems to have been from a subterranean road between the Church of S. Sebastian and S. Urban, in the district called by the name "of the Catacombs"; it is close to the circus of Maxentius, and the tomb of his son Romulus, which is called *ad Catacumbas* by the contemporary historians. But as these burial-places are older than the time of Maxentius, the district may have been named from them, and not they from the district. This is the valley under the hill on which the great tomb of Cæcilia Metella stands. The Church of S. Sebastian also stands in it. This was originally called *the* Catacomb, because the entrance to many of them in that district was through that church. But the name is quite Mediæval; that used by Anastasius and all the early writers is *cemeteria*. The earliest pictures are in the subterranean entrance chapel of Prætextatus, where the vine is painted on the vault, and spread all over it, and is of the second century. On the wall of this chapel was a Good Shepherd, and the Roman Catholic antiquaries claim this as a proof that this catacomb is exclusively Christian from the beginning, but those who have studied the history of painting could see that the Good Shepherd was quite of a different class of art from the vine, and more probably of the fourth century. (I am sorry to say that this picture of the Good Shepherd has been destroyed in some repairs made about 1875.) Those who are at all acquainted with the catacombs will not need to be reminded of the very narrow passages called *corridors*, or *streets*, with the *loculi*, or graves, cut in the tufa walls on each side, nor of the numerous steps down into them, and the variety of small vaulted chambers called *cubicula*, one of which is frequently the burial-vault of a family. Many of these chambers of the fourth and fifth centuries have columns at the angles, with capitals and bases, and seats, with side-boards, all cut out of the tufa. The very large catacomb of Prætextatus was certainly not exclusively Christian; there are distinctly Pagan subjects in one of the chambers at the foot of the steps of one of the original entrances, and these are of the third century. In another chamber, or *cubiculum*, very near to this, the subjects are Christian, of the fourth century, apparently because the family had then become Christian. The burial-place of the worshippers of the Persian god Mithras is almost, if not quite, a part of this great catacomb, which is on the Via Appia, about two miles from Rome, at the corner of the cross-road that leads past S. Urban's. (If excavations could be made there, they would settle some long-disputed questions.) The principal catacomb, or burial-place of the Jews, is also very close to this; parts of this are of the first century, others of the fourth. The inscriptions and emblems in this are of special interest. (I am sorry to say that an Englishman purchased of the late Jew owner some of the most interesting and important of these emblems, and carried them off to his private museum in England, where they are of comparatively little interest; in their original places they were historical.)

The catacomb of S. Priscilla is considered by the Roman Catholics as the most interesting for the frescoes, which they consider as very early; some writers have even said they are as far back as the first century. Great stress is laid in particular on the chapel called the Capella Græca, which is in the form of the Greek cross, and may probably be of the third century, of the time that two of the bishops of Rome were Greeks, and there was no difference between the Greek and the Roman Church. Whether any of the frescoes of Christian subjects are really before the time of Constantine is very doubtful; one small picture on the soffit of the arch of an *arco-solium* (or niche for a sarcophagus), which is about 2 ft. square, and represents the Blessed Virgin, with a star over her head, and with some one addressing her, called "the Prophet of Bethlehem," is said by the Roman Catholic antiquaries to be very early. If compared with the frescoes in the painted tombs on the Via Latina, which are dated by brick-stamps in the walls, as of the third century, it seems hardly possible to imagine that any of the paintings in the catacombs can be of the same period; the drawings of them are very inaccurate when made out by modern artists; the photographs are the only really accurate representations of them. In this catacomb is another celebrated picture, that of the wine-barrels, to which various symbolic meanings are attached. It appears to me to have been the burial-place of the wife of a wine-merchant, and an inscription that was under the picture when my photograph was taken seems to agree with this; but this inscription has since been removed by the authorities. Another interesting picture is said to be the Woman of Samaria at the Well, and this seems probable. In very many of the catacombs there are figures in the Oriental attitude of prayer, erect, with the hands uplifted; sometimes they are at the four corners of a vault, supporting a central picture, perhaps the head of Christ, or the Good Shepherd. In other instances the *orante* is addressed by others. The *orante* are supposed to represent the persons interred, and many of the groups of figures are believed to be family groups. There are also many representations of feasts, which some call *agapæ*, others the Last Supper of our Lord. Some are evidently family burial-feasts, according to the well-known custom of the ancient Romans. The history of Jonah was a very favourite subject, with all parts of the story; sometimes he is being thrown overboard to a sea-serpent (which is the Vulgate version of what in the English version is translated a whale), sometimes he is under the gourd. We know by illuminations that the history of Jonah was a favourite subject with the artists in the fifth and sixth centuries, and some of these catacomb-pictures are of that period. The three children in the "burning fiery furnace" is another very common subject; also Moses striking the rock, Daniel in the lions' den, Noah in the ark, represented as a box. The most popular pictures in the catacombs, because the best preserved, are those in the catacomb of S. Pontianus in the Trastevere on the Janiculum; among them is the baptism of Christ, the jewelled cross, two large heads of Christ, and three figures of saints standing side by side, with their names written vertically; they are painted on a wall that crosses one of the corridors, evidently a repair of the ninth century, as the wall on which it is painted is of that period. A comparatively small part of this great catacomb has been restored for the pilgrims. I have crept through a hole in the wall, and have got behind this cross-wall, and found the rest of the catacomb in a state of complete ruin, as left by the Lombards.

The lectures, as already stated, were copiously illustrated by photographs thrown on the screen by means of the magic lantern and oxyhydrogen lime-light. They were not so fully attended as they deserved to be, but the sparse attendance did not imply any lack of interest in the subject, as we were informed that many purchasers of tickets were unable to be present.

NEW WATERWORKS FOR MANCHESTER.

A GIGANTIC PROJECT.

THE Corporation of Manchester have just resolved upon a gigantic scheme for the future supply of water to that city. At their meeting last week the Town Council decided upon the construction of works for obtaining water 100 miles from Manchester. The district selected is Thirlemere Lake, which is situated on the west side of the road between Ambleside and Kendal, in Westmoreland, and close to the favourite and well-known little inn at Whitburne, from which many lake tourists make the ascent of Helvellyn. The high level of the lake and the purity of the water, together with the unbounded supply, is said to be strong recommendations in favour of this great scheme.

According to the design of Mr. Bateman, the engineer, the water is to be carried from the lake under Dunmail Raise (one of the Westmoreland mountains) by a tunnel, and then passed above Grassmere, Rydal, and Ambleside, to the river Troutbeck, crossing this stream by an inverted cast-iron syphon pipe. The tunnel is thence continued through an open country to the south-west of Windermere railway station. The conduit, or aqueduct, will be kept mostly to the hills, and entering Lancashire it crosses the River Lune about five miles from Lancaster. It is thence continued southward, in the direction of Garstay and Preston, crossing the River Ribble about five miles to the east of the last-named town. It then proceeds in a south-easterly direction, until it reaches the neighbourhood of Rivington, passing close under the Rivington reservoirs of the Liverpool Corporation Waterworks, and finally terminates in a large service reservoir near Bolton, some twelve miles from Manchester.

The calculation is, that Thirlemere will give a total supply of 50,000,000 gallons of water daily, but in the first instance it is only intended to take 10,000,000 gallons daily, for each of the syphons which will cross the respective rivers will only take that quantity, and as the demands of the City increase additional syphons will be fixed. It is expected that the first supply will not reach Manchester before an expenditure of 2,000,000*l.* has been incurred, and a proportionate additional outlay will be necessary when the supply is increased in the way already explained. Several professors who have tested the water give their testimony as to the excellence of the water, both as regards its purity and softness. From the magnitude of the works it is believed it will take about seven years before the first supply is obtained, and at the end of that period it is calculated that the present water-supply of Manchester will be insufficient for the requirements of the then population, and hence the corporation are anticipating the wants of the inhabitants of the city as regards this important sanitary agent.

It is believed that in carrying out this great project the Manchester corporation will be prepared to enter into arrangements for the supply of water to Preston, Lancaster, Bolton, and other localities intersected by the works, the supply at the source being unlimited and inexhaustible, and it is likewise not improbable that arrangements will be made with the Liverpool corporation (who for some time past have had the question of their future water-supply under consideration), by which Liverpool may have the benefit of the supply which the Thirlemere project will give them, by constructing additional service reservoirs at Rivington in connexion with their own and the Manchester corporation's new projected works.

The Liverpool Art Gallery.—At a meeting recently of the Liverpool Town Council, Mr. Charles Dyall, master of the Liverpool Lyceum, was appointed curator of the Art Gallery, Mr. G. Barry Wallis, son of Mr. George Wallis, of South Kensington, having withdrawn from the competition, though recommended for the appointment. Mr. Wallis objected to the secretarial duties associated with the post.

INDUSTRIAL CLASSES OF THE CANARY ISLANDS.

THE artisan class, which in point of numbers is next in importance to the agricultural, consists principally of masons and stone-cutters, carpenters, boot and shoe makers, tinmen, blacksmiths, and silversmiths. The last-named are few in number, and carry on a very limited trade, which is principally in repairing trinkets of gold and silver, mostly cheap and inferior articles imported from France and Germany. There are also a few watchmakers, or dealers in watches, whose skill in their art does not generally go beyond the power of cleaning and of repairing slight defects in clocks and watches. The great majority of the artisans are very backward in their different callings, and it is remarkable that no articles of any description are made in these islands showing any special taste or aptitude, such as are found in abundance in the neighbouring island of Madeira, and in most other countries, whether civilised or barbarous. Notwithstanding this evident want of ingenuity and industry, they entertain high opinions of their merits. An artisan in a relatively superior position has been heard to say, and evidently with a strong conviction of the force of his remark, that workmen in the Canary Islands were very superior to the English, because they could make with their hands articles which in England could only be made by machinery.

The ports of these islands being free ports, all manufactured articles of every description required for general use are imported from foreign countries and from Spain, and are better than those that can be made in the province, and are cheaper. The 2,460 persons belonging to industry are employed in the small silk-factories at Santa Cruz, in the island of Palma, and at Teod, in Teneriffe, in the different establishments for making paper lucifer-matches, and in those for the manufacture of cigars and cigarettes. More women and children than men are employed in the foregoing industries. The silk factory in Palma employs from thirty-six to forty persons, whose wages do not exceed 6 peals vellon, or 1s. 3d. per day, the working-hours from sunrise to sunset. The principal occupation consists in winding off the cocoons, the silk being mostly bought up and imported in that condition. The factory is active from June until the end of the year, the worms being reared and the cocoons prepared during the three months from March to June.

Most of the capital and labour of the province is employed in agriculture, the staple commodity being cochineal; and since the fall in the price of that article the cultivation of tobacco has been resumed, and is likely to be considerably developed. But the agricultural labourer is in a very primitive condition, totally without education. He is, however, well-mannered, and mild in disposition, and possesses considerable physical advantages. A stranger might travel unarmed over all the islands without fear of bodily hurt, but be on his guard against minor delinquencies. The labourer lives principally on salt fish and potatoes, and in lieu of bread an aliment made of toasted wheat, barley, or Indian corn, ground into flour, and mixed with sufficient water to give it the consistency of dough. It is called "gofio," and was used by the Guanches, the ancient inhabitants of Teneriffe, and the aborigines of the other islands. An English blanket worn as a mantle is the winter wrap of the country people. Some of the agricultural labourers dwell in ill-ventilated and undrained rooms on the ground-floors of houses situated in the outskirts of the towns; others in the country in huts made of a few large stones at the base, the upper part being of mud and beams, with a thatched roof. Those who are in a better condition own a pig, a goat or two, a dog, and sometimes a donkey. Their wages average from 1s. to 1s. 6d. a day; in remote localities they are generally paid in goods instead of money. The "Medianero" is a superior person belonging to his class; he holds more nearly the position of a small farmer in England, and, as his title implies, obtains in most instances one-half the produce of the land which he cultivates, the other going to the proprietor, who also provides him with a dwelling.

The purchase-power of money is about one-third less than that in England, owing to the exorbitant demands of the retail dealers. Salt fish, tea, and rice are sold at prices varying from 200 to 300 per cent. and more above wholesale prices. It is more profitable to import from abroad what each requires than to obtain it in the local stores and shops, but very few possess the facilities for so doing. Bread is sold at from 2½d. to 3½d. per 1 lb. loaf, and is made of inferior flour. Meat is practically in the hands of the municipalities; it is often of very inferior quality, and costs from 5d. to 7d. per lb. The sale of fish is also the monopoly of the few seafaring men at the different ports who are enrolled for service in the navy. Their open boats and tackle are insufficient, and they only go out to sea when the weather is fine and pleasant. The natural consequences of this arrangement are high prices and often scarcity in the supply, although these seas are alive with various sorts of excellent fish. The ordinary wines of the country are poor and scarce, and are not generally consumed. Spanish ordinary wines, which are so good, abundant, and cheap in the peninsula, are sold in the islands at from 6d. to 8d. a quart, but the inferior qualities are imported, and are generally adulterated to a great extent. English draught beer can be obtained of a very inferior quality for 3d. a glass. Looking at the favourable geographical position of these islands, to which every description of goods can be brought by water carriage at moderate freights, articles of first necessity should be cheap, but they are not, and moderate luxuries are out of the reach of the comparatively well-to-do classes. One of the elements wanted in order to develope the natural resources of the country is the skill of foreign artisans. But no inducement is offered either by the Government or the people. There is a want of respect and consideration for foreigners which might possibly be turned into one of hostility towards intelligent foreign artisans who would, by their superior skill and industry, become the successful rivals of the native workmen. From all accounts, indeed, the industrious English workman is not likely to improve his condition should he be induced to seek for employment in the Canary Islands.

QUESTIONS FOR DISCUSSION AT THE SOCIAL SCIENCE CONGRESS.

THE special questions for discussion at the Aberdeen Congress are in the *Health Department* as follow:—

1. What is the best mode of providing suitable accommodation for the labouring classes, and of utilising open spaces in towns?
2. How can the sanitary condition of the population engaged in the coast fisheries of Scotland and the United Kingdom be improved?
3. The present state of house accommodation in rural districts,—can its evils be remedied?

In the *Economy and Trade Department*:—

1. What are the causes of the present general depression of trade all over the world?
2. What are the social effects of trade-unions, strikes, and lock-outs?
3. What are the results of the administration of the Poor-laws in Scotland as compared with those of the other parts of the United Kingdom?

In the *Art Department*:—

1. What principles should govern the restoration of ancient buildings, or their preservation as memorials?
2. Is our modern system of art competition favourable or unfavourable to art-progress?
3. How can art be introduced into the houses of persons of limited income?

NEW SCHOOLS AND MUSEUM AT HAMBURG.

SCARCELY two years before those days of the great fire of 1842 which are recorded in the annals of Hamburg as *dies atræ*, the building called the Johanneum, and containing the higher schools and the city library, was completed. It escaped, fortunately, that terrible conflagration, which lasted for four days, in which over 100 lives were lost, 4,219 houses in 75 streets burnt down, and which caused a loss of 13,500,000*l*. Although it has served up to the present time the purposes for which it was erected, it had long become too small for the increasing number of scholars; additional rooms had to be hired in neighbouring private houses to accommodate them. A remedy had ultimately to be found for this evil, and in 1873 plans for new buildings were sanctioned by the council and the citizens. They were commenced in 1874, and inaugurated at the close of last year. The buildings provide space for the Realschule (or high school), the Gewerbe- und Bauhandwerkerschule (school for the training of architects, engineers, &c.), and the Museum of Arts and Industry.

Our view represents the buildings as seen from the north-east. The Steinthorplatz, where it is situate, is one of the finest squares of the old Hanse town. To the right, in the background, towers the high steeple of St. Nicolai, a work completed quite recently. The buildings are in the form of a square, with two large courtyards, and are erected in the Renaissance style. Herr Baudirector Zimmermann is the architect; the cost is about 150,000*l*.

The principal façade is the east front, seen in the light in our illustration. The smooth wall simply plastered in grey cement, are harmoniously broken by high windows. The windows and framings of the portico, as well as all the entablatures, are neatly executed in Saxony sandstone. A number of portrait medallions of Hamburg celebrities, as well as of coriphei of German literature and arts, are let in over the windows of the second story of the east, south, and west fronts.

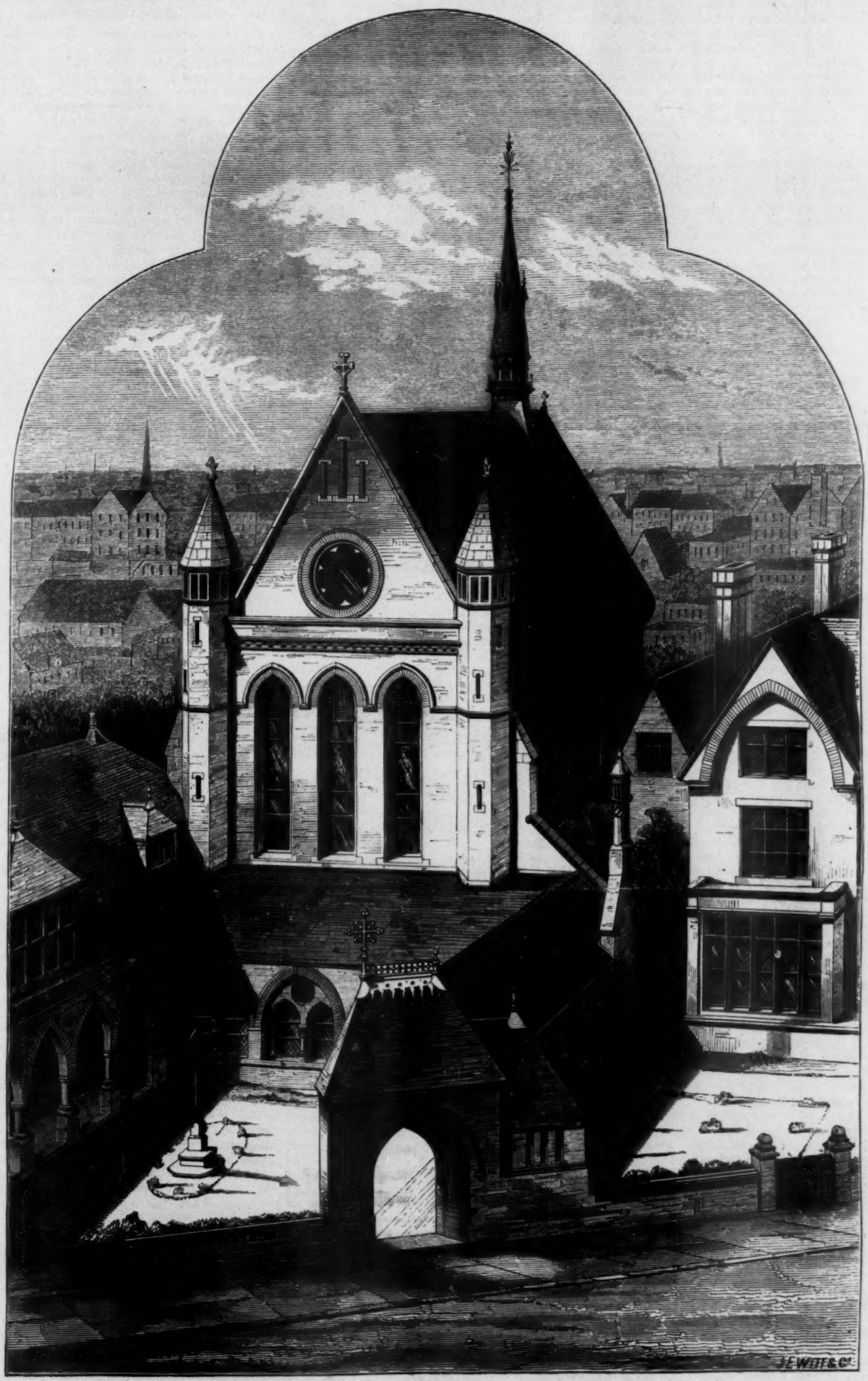
On ascending the steps of the principal entrance, and passing through two handsomely-decorated vestibules, the grand staircase is reached. The subdued light, falling through a richly-ornamented skylight, lights up a double staircase of yellow French marble. In the first floor, on the east, is the spacious, well-adorned aula, which, bordered by rooms on each side, connected with it by folding-doors, give ample sitting-room for at least 500 persons. Several other rooms join on to the aula and its side-rooms, which, like the latter, are used by the schools in common; for instance, the chemical laboratory, the lecture-room for physical sciences, &c. The principal portal is also the entrance to the exhibition rooms of the Museum; they are situate in the ground story, and include twenty-three large rooms. Besides these, there are, in the same story, the residence of the headmaster of the Gewerbeschule and the hall for gymnastic exercises. The other rooms of the first and second stories, about seventy, are taken up, on the south side, by the Realschule, on the north by the Gewerbeschule. To these must be added the localities, used by both schools in common, for scientific instruction, as well as a board-room, an office, rooms for teachers, &c. On the roof of the centre building is also an observatory. The warming of the whole buildings is effected by eighteen califéres distributed throughout the basement; a steam-engine located under the grand staircase sends, by means of two large ventilators, hot air as well as cool air through the respective pipes in all directions. In the basement are further, besides the usual offices, residences for the housekeeper and his subordinates. An excellent communication right round the buildings is provided by well-lighted corridors running along the sides of the courtyard, and connected with each other by seven commodious and elegant stairs.

NEW WHOLESALE MARKETS AT LIVERPOOL.

GREAT changes are contemplated in the public markets at Liverpool, and it is believed that the present retail markets, including the spacious St. John's Market, in the centre of the town, near St. George's Hall, will shortly be given up, whilst new wholesale markets for the sale of meat, vegetables, and fish will in all probability be shortly erected. Great inconvenience is at present felt at the inadequacy of the present wholesale fish-market accommodation, and at the last meeting of the Council the Markets Committee reported that they were preparing a comprehensive scheme to meet the requirements of the wholesale fish trade. It is believed that this scheme involves the construction of a large new fish market in extension of the existing market, and that the carrying out of the project will necessitate the absorption of the Amphitheatre, the largest place of dramatic entertainment in Liverpool.

A Sanguine Town Council.—The Exeter Town Council have for a long time been negotiating with the gas company for the purchase of their works, one of the conditions of purchase being that the Town Council should secure to the original shareholders 10 per cent. in perpetuity. The Town Council have now, however, virtually decided, by a majority of 20 to 8, to break off the negotiations, mainly on account of the success of the electric light, and the probability of its superseding gas.

NEW SCHOOLS AND MUSEUM, HAMBURG.—HERR BAUDIRECTOR ZIMMERMANN, ARCHITECT.



THE CATHOLIC APOSTOLIC CHURCH, CAMBERWELL.—MESSRS. J. & J. BELCHER, ARCHITECTS.

CATHOLIC APOSTOLIC CHURCH, CAMBERWELL NEW ROAD.

THIS church, of which we give an illustration, has lately been opened. It is in the Early English style, and built of red bricks, with stone dressings. In front of the main building, which is set back from the roadway upwards of 40 ft., there is a cloister. The north and south sides lead into the narthex, from which there are four separate entrances into the church. The church consists of a nave of five bays, with north and south aisles, transepts, and a spacious chancel, 40 ft. in depth, terminating with a semicircular apse. The south transept forms a chapel, and in the north transept is placed the organ and choir. It has a vaulted ceiling decorated. The chancel has nine upper windows, five of which are filled in with stained glass, containing representations of our Lord in the centre, with the four evangelists on either side. The chancel is in three divisions, viz., the sanctuary, the upper (priest's) choir, and the lower or deacon's choir. In the sanctuary is the altar-table, on which is a tabernacle where the consecrated bread and wine are reserved for the communion of the sick. The altar-table is of Caen stone, with marble shafts, elevated by three steps above the level of the sanctuary; a lofty baldacchino surmounts it. At the west end, under a recessed canopy or niche, is placed the font. It is in Caen stone, with red Irish marble shafts. There is a band round the font, and four medallions, containing bas-reliefs of the Crucifixion, Resurrection, Ascension, and Descent of the Holy Ghost. The font has been executed by Mr. J. W. Seale, of Walworth. Beyond the chancel there are several vestries for the priests, deacons, and choir, whilst at the west end, near the cloisters, there is a retiring-room for females, together with the other rooms for meeting in connexion with the church. The architects are Messrs. J. & J. Belcher, and the builders are Messrs. Braid & Co., of Chelsea. The buildings were erected at a cost of something more than 8,000*l*.

LIGHT: ITS SANITARY INFLUENCE AND IMPORTANCE IN BUILDING.*

I DO not propose to enter the pitfall of unprofitable speculation, but shall consider merely the natural light in so far as it relates to architecture and hygiene. And here I may as well touch at once the main point of the relation of architecture to the science of light, by humbly acknowledging that of all men who have contributed to the development of our art, there is no one who deserves more our gratitude than the glass-maker, who first enabled the builders of dwelling-houses to furnish mankind with light, warm, and cheerful homes, in place of dark, cold, and dismal huts, or chilly palaces. The window is the second eye of man, without which the dwelling-house would be simply a kennel or a cave. Many new and wondrous things have been discovered in regard to this same g'ass, even within these past few years. A Frenchman has made it malleable. Gen. Pleasanton, by painting every eighth pane of his conservatory, has made it so fructifying to plants and animals that if his statements prove true, and his "discovery" generally applicable, this whole earth of ours will soon be overran with living organisms; and poor Malthus, who thought even our present increase of population dangerously large, will turn in his grave with vexation and despair. Nay, has not Mr. Shrove proposed to make use of this wonderful material for effecting what none of the numberless schools of medicine have as yet been able to effect,—the utter banishment of disease from this planet of ours?—with sanitaria such as he sketches for us, with glass houses of so vast an extent that each covers forty acres of ground, filled with the most varied kinds of plants, flowers, vines, and trees, laid out on the plan of the most luxurious parks, and high enough for the erection within the grounds of hotels, schools, libraries, &c., wherein ten thousand people may every winter season enjoy the delights of a perpetual spring and summer climate, undisturbed by changes of weather and the like nuisances of out-door existence; wherein no "probabilities" are tolerated, the thermometer being established as the only trustworthy weather-cook. However, everything has its limits of utility, even glass, in its relation to health; and it is the architect's special business to investigate those limits. Not all glass, in its function of transmitting light, is of equal value: it may be too thin or too thick, or the material of which it is made may have been mixed with injurious substances, or badly solidified. It may be placed in the wrong position, and become a constant source of irritation, or there may be too much of it, &c. I desire to call particular attention to these injurious qualities which light may exercise in passing through glass, as it is a subject hitherto almost entirely neglected.

Have you not often noticed the peculiar heating and oppressive effect made upon you by sunlight that has passed through the thick French plate glass now so general in use? It is a feeling very much akin to that experienced on a sultry, sunny, *electric* summer day, before the storm has gathered. You do not feel it when you open the window and stand in the free sunlight, nor is it perceptible through every kind of glass. But this thick plate glass invariably produces it, especially when the rays of the sun fall upon it in an oblique direction, and in the winter time. It would seem evident that the heat rays and the magnetic rays which light produces in its transit through our atmosphere gain the preponderance over the pure light rays by passing through the glass, and, destroying the equilibrium, injure our health. A window, again, with a number of small panes, especially if the panes are of uneven and coarse glass, makes you giddy by the unevenness of the rays that cross each other from pane to pane; and the same objection would apply to a house built with glass alone, such as Mr. Shove dreams of. A similar effect is produced, indeed, by reflected light of every kind. Hence the necessity of regulating the colour of the walls in a room with regard to the number and position of the windows, of avoiding placing mirrors in such a position that the light falls upon them, &c. All reflected light has an injurious effect; not upon the body only, but also upon the mind. I cannot understand, therefore, why Sir David Brewster, who otherwise is so judicious in his remarks on this subject, should suggest:—"The opposite sides of the street or lane should be kept whitewashed with lime; and for the same reason the ceilings and walls of the apartments should be as white as possible, and all the furniture of the lightest colours."

For the whitewashed houses on the opposite side of the street must necessarily cast their reflected light through the windows on the other side, and the extremely white ceilings and walls there would only make matters worse. This remark, of course, applies only to streets that admit sunshine; for in dark streets or rooms such whiteness may not be only allowable but absolutely needful and healthful. I intended simply to point out the necessity of avoiding extremes, and to call your attention to the care which the architect must take in regulating the light as well as the heat of his building. That dark streets, alleys, cellars, rooms, &c., may stand greatly in need of light-beams is thus very neatly exemplified by Dr. Brewster:—"In all great towns where neither houses nor palaces can be insulated, there are in almost every edifice dark and gloomy crypts thirsting for light; and in the city of London their are places of business where the light of day never enters, and where the precious light which the sky sends down between chimney-tops is allowed to fall useless on the ground. On visiting a friend whose duty confined him to his desk during the official part of the day, we found him with bleared eyes, struggling against the feeble light which the opposite wall threw into his window. We counselled him to extend a blind of fine white muslin on the outside of his window, and flush with the wall. The experiment was soon made. The light of the sky above was caught by the fibres of the linen, and thrown straight upon his writing-table, as if it had been reflected from an equal surface of ground glass. We may mention another case equally illustrative of our process. A party visiting the mausoleum of a Scottish nobleman, wished to see the gilded receptacles of the dead which occupied its interior. There was only one window through which the light entered, but it did not fall upon the objects to be examined. Upon stretching a muslin handkerchief from its four corners, it threw such a quantity of light into the crypt as to display fully its contents."

This reflected light thrown into a dark room from a white handkerchief or a white screen is not hurtful, simply because it is, in point of fact, not reflected but direct light, or, in other words, the source of light in the dark room. It is just as if a lamp or candle were lighted in the room. But that the reflected light from the white walls of a room which is itself lighted up by direct light has a disagreeable effect, every one can easily test for himself. I quote, however, from Miss Nightingale's "Notes on Nursing":—

"Who has not observed the purifying effects of light, especially of direct sunlight, upon the air of a room? Here is an observation within everybody's experience. Go into a room where the shutters are always shut (in a sick-room or a bedroom there should never be shutters shut), and though the room be uninhabited, though the air has never been polluted by the breathing of human beings, you will observe a close, musty smell of corrupt air,—of air, *i.e.*, unpurified by the effect of the sun's rays. The mustiness of dark rooms and corners, indeed, is proverbial. The cheerfulness of a room, the usefulness of light in treating disease, is all-important. Heavy, thick, dark window or bed curtains should, however, hardly ever be used for any kind of sick in this country. A light, white curtain at the head of the bed is, in general, all that is necessary, and a green blind to the window, to be drawn down only when necessary. 'Where there is sun there is thought.' All physiology goes to confirm this. Where is the shady side of deep valleys, there is cretinism. Where are cellars and the unsunned sides of narrow streets, there is the degeneracy and weakliness of the human race, mind and body equally degenerating. Put the pale, withering plant and human being into the sun; and, if not too far gone, each will recover health and spirit. It is a curious thing to observe how almost all patients lie with their faces turned to the light, exactly as plants always make their way towards the light. A patient will even complain that it gives him pain 'lying on that side.'—'Then why do you lie on that side?' He does not know; but we do. It is because it is the side towards the window. A fashionable physician has recently published in a Government report, that he always turns his patients' faces from the light. Yes, but nature is stronger than fashionable physicians; and, depend upon it, she turns the face back, and towards such light as she can get. Walk through the wards of a hospital, remember the bedsides of private patients you have seen, and count how many sick you ever saw lying with their faces towards the wall."

And why do they not turn their faces towards the wall? Because if it does give light, that light is reflected, and hurts them, even when it has to pass through their eyelids; and if it does *not* give light, they turn from it to hunt up light. The all-overpowering delight of the patient, and indeed every health-desiring human being, however, and the sweetest treat for the eye itself, is to be able to look through the direct light of God's atmosphere into the blueness of the sky, that most wonderful mixture of darkness and light,—that dark back-ground of the infinite, lighted up with the clearness of light to the very shade suited to human eyes. I cannot forbear to illustrate further the importance to architects of obtaining this direct communication with light and the sky in all the rooms of their buildings, than by quoting again from Miss Nightingale:—

"Second only to fresh air, however, I should be inclined to rank light in importance for the sick. Direct sunlight, not only daylight, is necessary for speedy recovery, except perhaps in certain ophthalmic and a small number of other cases. Instances could be given, almost endless, where in dark wards, or in wards with a northern aspect, even when thoroughly warmed, or in wards with borrowed light even when thoroughly ventilated, the sick could not by any means be made speedily to recover. Among kindred effects of light, I may mention from experience, as quite perceptible in promoting recovery, the being able to see out of a window, instead of looking against a dead wall; the bright colours of flowers; the being able to read in bed by the light of a window close to the bed-head. It is generally said that the effect is upon the *mind*. Perhaps so; but it is no less so upon the *body* on that account. All hospital buildings in this English climate should be erected so that as great a surface as possible should receive direct sunlight,—a rule which has been observed in several of our best hospitals, but, I am sorry to say, passed over in some of those most recently constructed. Window-blinds can always moderate the light of a light ward; but the gloom of a dark ward is irremediable. The axis of a ward should be as nearly

* Read before the State Charities Aid Association, by Mr. Carl Pfeiffer, and printed in the *American Architect*.

as possible north and south; the windows on both sides, so that the sun shall shine in (from the time he rises till the time he sets) at one side or the other. There should be a window to at least every two beds, as in the case now in our best hospitals. Some foreign hospitals, in countries where the light is far more intense than in England, give one window to every bed. The window-space should be one-third of the wall-space. The windows should reach from 2 ft. or 3 ft. of the floor to 1 ft. of the ceiling. The escape of heat may be diminished by plate or double glass. But while we can generate warmth, we cannot generate daylight or the purifying and curative effect of the sun's rays."

What Miss Nightingale here says about the employment of plate and double glass is quite correct, so far as the production of more heat is concerned; which, however, is not caused because the thickness of the glass prevents the escape of heat from the room,—as may be shown by letting fresh air into the room from other openings,—but because that kind of glass passes more of the heating, and especially of the actinic, or magnetic, or electric rays of light into the room, or generates those qualities of magnetism, &c., in passing it. For, as M. Emile Saigney, the eminent French writer, clearly puts it, "all forms of light exhibit three kinds of rays,—those which are purely luminous, those which are also calorific or heating, and those which are chemical or magnetic. And I may here add a fact, which will explain the difference in the light transmitted through different kinds of glasses. The purely luminous rays of light we, of course, never see, precisely because they are light, and we can only see colour; but we feel them, and see by means of them. Now of the other rays of the spectrum, or of the coloured light, it is generally known that the yellow, orange, and red rays are specially heating, while the blue, indigo, and violet rays are especially magnetic; but it is not so generally known that the maximum of heat is found in the dark region beyond the red, and that those which are refracted upon the other side, beyond the violet, have a special aptitude for exciting chemical action.

I do not propose to enter into an examination here as to why the so-called dark or invisible rays of light, in its appearance to us, should possess these different qualities in a pre-eminent degree: I merely propose to suggest that every different kind of glass may change the relation between the luminous, calorific, and chemical rays, even as the prism,—to which all glass is more or less alike—changes it. Thus, if a solar ray be received upon a prism of water, the maximum of heat will appear in the yellow, upon a prism of common glass in the red, upon a prism of flint glass beyond the red, upon one of rock salt far beyond the red in the entirely dark portion.

Now, it may very well be, nay, unquestionably is, a fact, that in the case of some (invalid) persons a superabundance of electric rays may be beneficial for health, and excite a feeling of pleasure; and this is the fact upon which General Pleasanton has built his "blue light" theory.

I think the overwhelming majority of facts,—not to speak of the natural supposition that if we needed more indigo in our light it would be there,—confirms Miss Nightingale's statement of the vast superiority of pure sunlight coming direct from the blue sky, and changed as little as possible by the windows through which it passes. If shading is needed, shutters or curtains can be made to act as the eyelashes of the window, and like them keep away a superfluity of light; and if properly constructed so as to allow a change of colours, all the benefits peculiar to the divers kinds of light-rays can likewise be obtained. Those who are suffering from any form of mental irritation or nervousness, for instance, can place themselves under the influence of neutral tints, blue, violet, &c., while the dull, indolent, and depressed may derive benefit from the stimulating colours of red and scarlet. Miss Nightingale seems to think that "shutters should never be shut in a sick-room or bedroom;" but this, I fancy, is only an exaggerated statement, or, perhaps, made with special reference to the dark atmosphere of England. Extremes are always to be avoided. There may be days or hours when there is too much light in a room, and too much light is also dangerous; it is not only apt to produce partial or total blindness, hemeralopia, violent disarrangement of the nervous system, &c., but even insanity and death. The tyrant Dionysius, who was aware of the terrible torture produced by an intense degree of light, especially when reflected, inflicted on some of his unhappy prisoners the dreadful punishment of compelling them to pass rapidly from great darkness to the full blaze of the sun in recently white-washed rooms. Let us, therefore, by all means, furnish our buildings with abundant provisions for the entrance of light: but, at the same time, let us not neglect to provide for its control whenever it is likely to become excessive,—by means of the shutter; and for its purification, as it were, whenever the composition of its rays is not in harmony with the eye,—by colours.

Let us deal with light just as we do with heat,—supply enough of it, but never in excess, and purify it by ventilating apparatus in every room of the house. There is one class of buildings to which this applies particularly,—our school-houses. No other buildings stand so much in need of pure air and sufficient warmth or ventilation, and of an abundance of pure light properly arranged with a view to its fall on the pupils' eyes. For not only are the eyes of the children exceptionally tender, but being compelled to pass the most of their school time in a more or less bent position, however scientifically the school furniture may be arranged, and to strain their eyes by looking upon the white paper in most of their studies, these children require that special attention be paid to the arrangements made for the introduction of light into their rooms, and its proper shading, when from the changed position of the sun or other causes this becomes necessary. Their playgrounds, on the other hand, cannot be too open to the solar light,—a rule of hygiene that many of our public schools sadly overlook, and which public and private institutions deliberately and constantly violate, by erecting high walls around the grounds of their institutions, as if the sun were the deadly enemy of mankind instead of its best friend. The effects of such a dark, enclosed playground on children, and the contrary effects of full exposure to sunshine, are thus happily described in an old number of the *Pall Mall Gazette*, by Dr. Wynter. He says:—

"Passing round St. Paul's Churchyard the other day, our ear caught a low, confused sound which seemed to issue from behind a grille under the gloomy portico of St. Paul's School. Attracted by so unusual a sound, and blinded for a moment by passing from the sunlight under the portico, we at length made out that the sound was that of boys' voices in play. After a little time, when our eyes had been accustomed to the darkness, we perceived that some score of boys were actually at play within its unhappy shade. Such a profound sanitary error on the part of the authorities of the school, to shut up their youth in a cage without light or air, and there bid them play, struck us with some astonishment. Boys at their games are like young birds singing on the bough,—half their joy in the result of the influence of the sunny air. We are told, indeed, that only a very short time is spent in this gloomy retreat; but surely it is hard that the hour of recreation, when academic art should give way to nature, should be selected for this depressing process as at present carried on. What would Dean Colet have said to it? When the St. Martin's National School, leading out of Endell-street, was built some years ago, we noticed with pleasure that a playground was built *at the top of the school*, where light and air were plentiful,—conditions essential in a playground where the children use violent exercise; but this example, we are sorry to see, has no effect upon the Mercers' Company. The necessity of light for young children is not half appreciated. Many of the afflictions of children, and nearly all the cadaverous looks of those brought up in great cities, are ascribable to this deficiency of light and air. When we see the glass rooms of the photographers in every street high up on the topmost story, we grudge them their application to a mere personal vanity. Why should not our nurseries be constructed in the same manner? If mothers knew the value of light to the skin in childhood, especially to children of a scrofulous tendency, we should have plenty of those glass-house nurseries, where children may run about in a proper temperature, free of much of that clothing which at present seals up the skin—that supplementary lung—to sunlight and oxygen. Glass-house nurseries lifted up to the topmost story would save many a weakly child that now perishes for the want of those necessaries of infant life."

Great benefit to the health would accrue by giving children what the ancients termed colour-, or "solar-air baths"; that is, permitting them to lie naked upon the bed or floor, free from the incumbrance of swaddling clothes, so that their bodies may be thoroughly brought under the influence, for some period of the day, of good air and bright sunlight.

Playgrounds and gardens arranged on the top of such buildings, as schools, hospitals, and even of private dwellings, &c., are, indeed, beginning to grow quite in favour, and in a large city, where ground is often the dearest part of those public buildings, can scarcely be dispensed with. "Some years ago," says Dr. Winslow, "when visiting the great Hospital of St. John, at Brussels, I was much impressed with the most judicious hygienic arrangements made in the construction of that building for the health and comfort of the invalids. On the roof of the hospital an elegant garden is laid out with great taste, and planted with shrubs, small trees, and a grass lawn, interspersed with pretty and sweet-smelling flowers. It is, in fact, a *Parc de Monceaux* in miniature. In this quiet rural retreat patients, particularly the convalescents, are permitted, at certain hours of the day, to promenade, indulging in the luxury of good air and bright sunlight."

Still more objectionable, however, than these enclosures of playgrounds put up for the special purpose of excluding sunlight, are those human habitations into which, under any circumstances, sunlight finds it impossible to penetrate; for while those playgrounds have at least access to the open air, being unroofed, the latter habitations have no access to pure air at all, but are, on the contrary, constantly filled with the foulest atmosphere. I allude, of course, to the cellar dwellings which, in our large cities, abound so plentifully and pitifully, and especially to those which are the dwellings of the worst classes of our population. All the murderers that may inhabit them are not a hundredth part as destructive of human life as these their dismal dens themselves. On a former occasion I have pointed out their destructiveness of life, with reference to the want of ventilation and pure air, and to the constant entrance, which they permit, of the poisonous gases that penetrate from the sewers and gaspipes of the street into them.

But now I wish to add that even the most bountiful provisions for the exclusion of those poisonous gases, and for the admission of pure air, could not atone for the want of light. Truly does Sir David Brewster say:—

"If the light of day contributes to the development of the human form, and lends its aid to art and nature in the cure of disease, it becomes a personal and national duty to construct our dwelling-houses, schools, workshops, factories, churches, villages, towns, and cities, upon such principles and in such styles of architecture as will allow the life-giving element to have the fullest and the freest entrance, and to chase from every crypt, cell, and corner, of the elements of unhealthiness and corruption which have a vested interest in darkness."

But as houses are built now, it is next to impossible to bring light into these underground rooms of our cities, even by adopting such artificial means as the white screens of which we have spoken before; and it is absolutely impossible to fill them with direct sunlight.

"Rightly recognising the life-giving and health-sustaining influence of this light," says Dr. Winslow in his work on "Light and its Influence on Life and Health," "the 'Towns Improvements Clauses Act of Scotland' enacted that no cellar less than 7 ft. high, without a window, and of which more than two-thirds are below the level of the street, should be inhabited. Acting upon the authority of this statute, the corporation of the city of Edinburgh has considerably improved the physical condition of the working classes of that town by peremptorily closing 3,000 dreary, cyclone dens in which the poor people were in the habit of residing." The same authority adds,—"It was computed not many years ago that in Liverpool between 30,000 and 40,000 people lived in cellars. As a consequence of this state of things, the health of the working classes became seriously affected. Legislative measures were adopted for the purpose of declaring such habitations were illegal, and those living in them were ejected by the strong arm of the law. In 1840, 4,760 cellars were cleared of 20,000 inhabitants."

I may add that in Germany also strenuous efforts have been made of late to prohibit the inhabitancy of cellars altogether. But no city in the world, I believe, is so cursed with dens

as the city of New York, even as it ranks pre-eminent amongst cities for the barbarous character of its tenement-houses, of which I now propose to say a little. In a recent sermon Dr. Tyng stated that in the more crowded districts of New York there are 200,000 people to the square mile, or 120,000 more than are packed in the same space in any part of London. More than 75 per cent. of the mortality in these tenement-houses, he added, was of children.

It may be well here to bear in mind the words of Charles Dickens, who wrote:—"Of all the coffins that are made in London, more than one in three is for a little child." Is not this a state of things so frightful as to require the most stringent interference of the law? But all the attempts hitherto made by our Board of Health to control the construction of buildings with a view to prevent at any rate the main cause of this wholesale assassination of our population have been opposed, owing chiefly to the insuperable objection of our people to the least interference with individual freedom. It is argued that if a man has the necessary money to pay for it, he is at perfect liberty to put up any kind of a house, tenement, or otherwise, though he have it so constructed as to make every room in it a Calcutta Black Hole, and that those who rent the rooms of him have only themselves to thank for the consequences. I say he has no such right. He infringes not only upon the right of his tenants, but, in our case, of every citizen of New York, since he assists in the spreading of all kinds of disease and crime. He is, in point of fact, no less a murderer than is the direct poisoner, for he erects laboratories that of themselves produce poison; and were it but for our own sake, it is time that an end should be put to this horrible occupation.

You will undoubtedly concede that in what I have said on the importance of constructing all human habitations in such a manner that each part thereof may be accessible to a sufficiency of light, and if possible of direct sunlight, I have not allowed myself to become one-sided in my plea. I have admitted, what is indeed self-evident to any observer, that we may have too much light, or special occasions may call for the shading of light or for giving predominance to special colours, and that hence the architect must also provide for these contingencies. Indeed, every climate requires that its architecture should conform in its arrangement of windows, &c., to the quantity and quality of the light which that climate possesses, as well as to its temperature. The aim of the architect in this direction must be, as I have said, so as to arrange his buildings that they will supply a sufficiency of light and heat, and yet keep both light and heat under perfect control. Let us, then, by avoiding extremes, not only pursue the right path, but also pave the way for it amongst the public. Nothing is more difficult than to introduce a change in a man's modes of thought and living when that change is advocated by extremists. It has been established by careful observation, that where sunlight enters all the rooms of a dwelling, the inmates are less liable to sickness than in a house where the apartments lose its health-invigorating influences. I fear that this fact is not sufficiently borne in mind in the construction of so-called apartment houses. Many are being built with bed-rooms into which direct sunlight never enters; they receive "borrowed" light only from shafts called "well-holes." Such arrangements ought to be prohibited by law. Such apartment-houses will, no doubt, increase the mortality among children, and contribute to the degeneracy of those who grow up within their walls.

Sir James Wylie, late physician to the Emperor of Russia, attentively studied the effects of light as a curative agent in the hospitals of St. Petersburg; and he discovered that the number of patients who were cured in rooms properly lighted was four times greater than those confined in dark rooms.

In all cities visited by the cholera, it was universally found that the greatest number of deaths took place in narrow streets and on the sides of those having a northern exposure, whence the salutary beams of the sun were excluded.

The Romans seem to have had a greater appreciation of the sanitary effects of sunlight than we have in this country at the present day; they had a Building Act in the time of Augustus, restricting the height of street fronts. It seems to me that such a law ought to be enacted for this city. They exist in the large cities of Europe; there the height of buildings is regulated by the width of the streets, and no one is permitted to deprive his neighbour of a sufficiency of sunlight. I wish I could enlist the interest of the gentlemen of the press to advocate a reform in these matters in this city. Buildings of such inordinate height as are on the north-east corner of Spruce-street and Nassau-street, on the south-east corner of Fulton-street and Broadway, on the north-west corner of Fifth-avenue and Forty-second-street, and many others of similar height, ought not to be permitted.

Florence Nightingale observes: "A dark house is always unhealthy, always an ill-aired house. Want of light stops growth, and promotes scrofula, rickets, &c., among the children. People lose their health in a dark house, and if they get ill they cannot get well again in it."

Dr. Edwardes, of Paris, says the action of light tends to develop the different parts of the body in that just proportion which characterises the species; and that, in warm climates, the exposure of the whole surface of the body to the action of the light will be very favourable to the regular conformation of the body. Humboldt confirms this in the account of his voyage to the equinoxial regions: He says, "Both men and women (whose bodies are constantly inured to the effect of light) are very muscular, and possess fleshy and rounded forms. It is needless to add that I have not seen among these people a single case of natural deformity."

In truth, the light and heat and chemical influence of the sun's rays may be considered as the physical value of all vital power. The inestimable cause of light as an element in the preservation of health, and treatment of disease, should be fully appreciated in the construction of all streets and buildings, particularly those intended as habitations for the poor, or public hospitals for the treatment of disease.

At the present day it is entirely too soon to take extreme ground on any phase of the light subject. It is a subject which, in its practical phases, is but just undergoing experiment and observation. If I have in any way contributed to direct more special attention to its relation *to health in dwellings*, and therefore to architecture in general, I shall feel quite satisfied with my efforts.

In conclusion, permit me to add yet a few words of an eminent physician:—"Let the sun come into our dwellings, and let our chambers be on the sunny side of the house. A room that the sun is not permitted to look into at all should be without a door; it is unfit for human occupancy. Even the flowers will grow pale and be frightened to death in it. The primary object of a window is not for the sons of men to look out, but for the sun to look in. Pleasant sunshine not only brightens a man's buttons, but his heart; it makes his spirit as cheerful as the landscape: he cannot be happy without it."

PROPOSED NEW MUNICIPAL BUILDINGS FOR GLASGOW.

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SOME system is very much needed by which, without greatly enhancing the cost, our buildings may be better secured against fire. We here offer some hints, but do not propose to make an absolute fireproof building in the sense of its being so secure against such an agent as to be indestructible; for that, at this age of the world, would be impossible; but we propose an arrangement by which, at a slight cost, a building may be rendered more fit to resist this devouring element. Neither do we claim for our method that it is the only one that will give good results; we simply offer it as one way in which fire may be prevented from accomplishing such fearful destruction as it sometimes does in a thickly-settled locality.

The first thing in order to have a building in any way fireproof is to see that it is built of such material as will best resist fire; the next, to see that it is properly built. Experience thus far has proved brick to be the best material with which to construct such a building. It is not as elegant as stone, yet, if treated rightly, very grand and imposing structures may be built of it. The parts are small, but if they are properly massed they may be worked up in a most imposing manner. The way in which the interior of the majority of our best buildings are made fireproof is by forming the floors of rolled iron girders, carrying brick arches; this, though, is quite expensive, and few can afford. But even such buildings have been devoured in large conflagrations almost as readily as those of more common construction. Few of the better class of buildings, in ordinary times, catch fire from within, and extend the fire to other buildings. Those which are the more apt to be the means of extending fire are generally of the cheapest class, probably fine-looking from without, but within devised in such a manner as to invite the rapid spread of flames.

as possible north and south; the windows on both sides, so that the sun shall shine in (from the time he rises till the time he sets) at one side or the other. There should be a window to at least every two beds, as is the case now in our best hospitals. Some foreign hospitals, in countries where the light is far more intense than in England, give one window to every bed. The window-space should be one-third of the wall-space. The windows should reach from 2 ft. or 3 ft. of the floor to 1 ft. of the ceiling. The escape of heat may be diminished by plate or double glass. But while we can generate warmth, we cannot generate daylight or the purifying and curative effect of the sun's rays."

What Miss Nightingale here says about the employment of plate and double glass is quite correct, so far as the production of more heat is concerned; which, however, is not caused because the thickness of the glass prevents the escape of heat from the room,—as may be shown by letting fresh air into the room from other openings,—but because that kind of glass passes more of the heating, and especially of the actinic, or magnetic, or electric rays of light into the room, or generates those qualities of magnetism, &c., in passing it. For, as M. Emile Saigney, the eminent French writer, clearly puts it, "all forms of light exhibit three kinds of rays,—those which are purely luminous, those which are also calorific or heating, and those which are chemical or magnetic. And I may here add a fact, which will explain the difference in the light transmitted through different kinds of glasses. The purely luminous rays of light we, of course, never see, precisely because they are *light*, and we can only see colour; but we feel them, and see by means of them. Now of the other rays of the spectrum, or of the coloured light, it is generally known that the yellow, orange, and red rays are specially heating, while the blue, indigo, and violet rays are especially magnetic; but it is not so generally known that the maximum of heat is found in the dark region beyond the red, and that those which are refracted upon the other side, beyond the violet, have a special aptitude for exciting chemical action.

I do not propose to enter into an examination here as to why the so-called dark or invisible rays of light, in its appearance to us, should possess these different qualities in a pre-eminent degree: I merely propose to suggest that every different kind of glass may change the relation between the luminous, calorific, and chemical rays, even as the prism,—to which all glass is more or less alike—changes it. Thus, if a solar ray be received upon a prism of water, the maximum of heat will appear in the yellow, upon a prism of common glass in the red, upon a prism of flint glass beyond the red, upon one of rock salt far beyond the red in the entirely dark portion.

Now, it may very well be, nay, unquestionably is, a fact, that in the case of some (invalid) persons a superabundance of electric rays may be beneficial for health, and excite a feeling of pleasure; and this is the fact upon which General Pleasanton has built his "blue light" theory.

I think the overwhelming majority of facts,—not to speak of the natural supposition that if we needed more indigo in our light it would be there,—confirms Miss Nightingale's statement of the vast superiority of pure sunlight coming direct from the blue sky, and changed as little as possible by the windows through which it passes. If shading is needed, shutters or curtains can be made to act as the eyelashes of the window, and like them keep away a superfluity of light; and if properly constructed so as to allow a change of colours, all the benefits peculiar to the divers kinds of light-rays can likewise be obtained. Those who are suffering from any form of mental irritation or nervousness, for instance, can place themselves under the influence of neutral tints, blue, violet, &c., while the dull, indolent, and depressed may derive benefit from the stimulating colours of red and scarlet. Miss Nightingale seems to think that "shutters should never be shut in a sick-room or bedroom;" but this, I fancy, is only an exaggerated statement, or, perhaps, made with special reference to the dark atmosphere of England. Extremes are always to be avoided. There may be days or hours when there is too much light in a room, and too much light is also dangerous; it is not only apt to produce partial or total blindness, hemeralopia, violent disarrangement of the nervous system, &c., but even insanity and death. The tyrant Dionysius, who was aware of the terrible torture produced by an intense degree of light, especially when reflected, inflicted on some of his unhappy prisoners the dreadful punishment of compelling them to pass rapidly from great darkness to the full blaze of the sun in recently white-washed rooms. Let us, therefore, by all means, furnish our buildings with abundant provisions for the entrance of light: but, at the same time, let us not neglect to provide for its control whenever it is likely to become excessive,—by means of the shutter; and for its purification, as it were, whenever the composition of its rays is not in harmony with the eye,—by colours.

Let us deal with light just as we do with heat,—supply enough of it, but never in excess, and purify it by ventilating apparatus in every room of the house. There is one class of buildings to which this applies particularly,—our school-houses. No other buildings stand so much in need of pure air and sufficient warmth or ventilation, and of an abundance of pure light properly arranged with a view to its fall on the pupils' eyes. For not only are the eyes of the children exceptionally tender, but being compelled to pass the most of their school time in a more or less bent position, however scientifically the school furniture may be arranged, and to strain their eyes by looking upon the white paper in most of their studies, these children require that special attention be paid to the arrangements made for the introduction of light into their rooms, and its proper shading, when from the changed position of the sun or other causes this becomes necessary. Their playgrounds, on the other hand, cannot be too open to the solar light,—a rule of hygiene that many of our public schools sadly overlook, and which public and private institutions deliberately and constantly violate, by erecting high walls around the grounds of their institutions, as if the sun were the deadly enemy of mankind instead of its best friend. The effects of such a dark, enclosed playground on children, and the contrary effects of full exposure to sunshine, are thus happily described in an old number of the *Pall Mall Gazette*, by Dr. Wynter. He says:—

"Passing round St. Paul's Churchyard the other day, our ear caught a low, confused sound which seemed to issue from behind a grille under the gloomy portico of St. Paul's School. Attracted by so unusual a sound, and blinded for a moment by passing from the sunlight under the portico, we at length made out that the sound was that of boys' voices in play. After a little time, when our eyes had been accustomed to the darkness, we perceived that some score of boys were actually at play within its unhappy shade. Such a profound sanitary error on the part of the authorities of the school, to shut up their youth in a cage without light or air, and there bid them play, struck us with some astonishment. Boys at their games are like young birds singing on the bough,—half their joy is the result of the influence of the sunny air. We are told, indeed, that only a very short time is spent in this gloomy retreat; but surely it is hard that the hour of recreation, when academic art should give way to nature, should be selected for this depressing process as at present carried on. What would Dean Colet have said to it? When the St. Martin's National School, leading out of Endell-street, was built some years ago, we noticed with pleasure that a playground was built *at the top of the school*, where light and air were plentiful,—conditions essential in a playground where the children use violent exercise; but this example, we are sorry to see, has no effect upon the Mercers' Company. The necessity of light for young children is not half appreciated. Many of the afflictions of children, and nearly all the cadaverous looks of those brought up in great cities, are ascribable to this deficiency of light and air. When we see the glass rooms of the photographers in every street high up on the topmost story, we grudge them their application to a mere personal vanity. Why should not our nurseries be constructed in the same manner? If mothers knew the value of light to the skin in childhood, especially to children of a scrofulous tendency, we should have plenty of those glass-house nurseries, where children may run about in a proper temperature, free of much of that clothing which at present seals up the skin—that supplementary lung—to sunlight and oxygen. Glass-house nurseries lifted up to the topmost story would save many a weakly child that now perishes for the want of those necessaries of infant life."

Great benefit to the health would accrue by giving children what the ancients termed *solaria*, or "solar-air baths"; that is, permitting them to lie naked upon the bed or floor, free from the incumbrance of swaddling clothes, so that their bodies may be thoroughly brought under the influence, for some period of the day, of good air and bright sunlight.

Playgrounds and gardens arranged on the top of such buildings, as schools, hospitals, and even of private dwellings, &c., are, indeed, beginning to grow quite in favour, and in a large city, where ground is often the dearest part of those public buildings, can scarcely be dispensed with. "Some years ago," says Dr. Winslow, "when visiting the great Hospital of St. John, at Brussels, I was much impressed with the most judicious hygienic arrangements made in the construction of that building for the health and comfort of the invalids. On the roof of the hospital an elegant garden is laid out with great taste, and planted with shrubs, small trees, and a grass lawn, interspersed with pretty and sweet-smelling flowers. It is, in fact, a *Parc de Monceaux* in miniature. In this quiet rural retreat patients, particularly the convalescents, are permitted, at certain hours of the day, to promenade, indulging in the luxury of good air and bright sunlight."

Still more objectionable, however, than these enclosures of playgrounds put up for the special purpose of excluding sunlight, are those human habitations into which, under any circumstances, sunlight finds it impossible to penetrate; for while those playgrounds have at least access to the open air, being unroofed, the latter habitations have no access to pure air at all, but are, on the contrary, constantly filled with the foulest atmosphere. I allude, of course, to the cellar dwellings which, in our large cities, abound so plentifully and pitifully, and especially to those which are the dwellings of the worst classes of our population. All the murderers that may inhabit them are not a hundredth part as destructive of human life as these their dismal dens themselves. On a former occasion I have pointed out their destructiveness of life, with reference to the want of ventilation and pure air, and to the constant entrance, which they permit, of the poisonous gases that penetrate from the sewers and gaspipes of the street into them.

But now I wish to add that even the most bountiful provisions for the exclusion of these poisonous gases, and for the admission of pure air, could not atone for the want of light. Truly does Sir David Brewster say:—

"If the light of day contributes to the development of the human form, and lends its aid to art and nature in the cure of disease, it becomes a personal and national duty to construct our dwelling-houses, schools, workshops, factories, churches, villages, towns, and cities, upon such principles and in such styles of architecture as will allow the life-giving element to have the fullest and the freest entrance, and to chase from every crypt, cell, and corner, of the elements of uncleanliness and corruption which have a vested interest in darkness."

But as houses are built now, it is next to impossible to bring light into these underground rooms of our cities, even by adopting such artificial means as the white screens of which we have spoken before; and it is absolutely impossible to fill them with direct sunlight.

"Rightly recognising the life-giving and health-sustaining influence of this light," says Dr. Winslow in his work on "Light and its Influence on Life and Health," "the 'Towns Improvements Clauses Act of Scotland' enacted that no cellar less than 7 ft. high, without a window, and of which more than two-thirds are below the level of the street, should be inhabited. Acting upon the authority of this statute, the corporation of the city of Edinburgh has considerably improved the physical condition of the working classes of that town by peremptorily closing 3,000 dreary, sunless dens in which the poor people were in the habit of residing." The same authority adds,—"It was computed not many years ago that in Liverpool between 30,000 and 40,000 people lived in cellars. As a consequence of this state of things, the health of the working classes became seriously affected. Legislative measures were adopted for the purpose of declaring such habitations were illegal, and those living in them were ejected by the strong arm of the law. In 1849, 4,700 cellars were cleared of 20,000 inhabitants."

I may add that in Germany also numerous efforts have been made of late to prohibit the inhabitancy of cellars altogether. But no city in the world, I believe, is so cursed with dens

as the city of New York, even as it ranks pre-eminent amongst cities for the barbarous character of its tenement-houses, of which I now propose to say a little. In a recent sermon Dr. Tyng stated that in the more crowded districts of New York there are 200,000 people to the square mile, or 120,000 more than are packed in the same space in any part of London. More than 75 per cent. of the mortality in these tenement-houses, he added, was of children.

It may be well here to bear in mind the words of Charles Dickens, who wrote:—"Of all the coffins that are made in London, more than one in three is for a little child." Is not this a state of things so frightful as to require the most stringent interference of the law? But all the attempts hitherto made by our Board of Health to control the construction of buildings with a view to prevent at any rate the main cause of this wholesale assassination of our population have been opposed, owing chiefly to the insuperable objection of our people to the least interference with individual freedom. It is argued that if a man has the necessary money to pay for it, he is at perfect liberty to put up any kind of a house, tenement, or otherwise, though he have it so constructed as to make every room in it a Calcutta Black Hole, and that those who rent the rooms of him have only themselves to thank for the consequences. I say he has no such right. He infringes not only upon the right of his tenants, but, in our case, of every citizen of New York, since he assists in the spreading of all kinds of disease and crime. He is, in point of fact, no less a murderer than is the direct poisoner, for he erects laboratories that of themselves produce poison; and were it but for our own sake, it is time that an end should be put to this horrible occupation.

You will undoubtedly concede that in what I have said on the importance of constructing all human habitations in such a manner that each part thereof may be accessible to a sufficiency of light, and if possible of direct sunlight, I have not allowed myself to become one-sided in my plea. I have admitted, what is indeed self-evident to any observer, that we may have too much light, or special occasions may call for the shading of light or for giving predominance to special colours, and that hence the architect must also provide for these contingencies. Indeed, every climate requires that its architecture should conform in its arrangement of windows, &c., to the quantity and quality of the light which that climate possesses, as well as to its temperature. The aim of the architect in this direction must be, as I have said, so as to arrange his buildings that they will supply a sufficiency of light and heat, and yet keep both light and heat under perfect control. Let us, then, by avoiding extremes, not only pursue the right path, but also pave the way for it amongst the public. Nothing is more difficult than to introduce a change in a man's modes of thought and living when that change is advocated by extremists. It has been established by careful observation, that where sunlight enters all the rooms of a dwelling, the inmates are less liable to sickness than in a house where the apartments lose its health-invigorating influences. I fear that this fact is not sufficiently borne in mind in the construction of so-called apartment houses. Many are being built with bed-rooms into which direct sunlight never enters; they receive "borrowed" light only from shafts called "well-holes." Such arrangements ought to be prohibited by law. Such apartment-houses will, no doubt, increase the mortality among children, and contribute to the degeneracy of those who grow up within their walls.

Sir James Wylie, late physician to the Emperor of Russia, attentively studied the effects of light as a curative agent in the hospitals of St. Petersburg; and he discovered that the number of patients who were cured in rooms properly lighted was four times greater than those confined in dark rooms.

In all cities visited by the cholera, it was universally found that the greatest number of deaths took place in narrow streets and on the sides of those having a northern exposure, whence the salutary beams of the sun were excluded.

The Romans seem to have had a greater appreciation of the sanitary effects of sunlight than we have in this country at the present day; they had a Building Act in the time of Augustus, restricting the height of street fronts. It seems to me that such a law ought to be enacted for this city. They exist in the large cities of Europe; there the height of buildings is regulated by the width of the streets, and no one is permitted to deprive his neighbour of a sufficiency of sunlight. I wish I could enlist the interest of the gentlemen of the press to advocate a reform in these matters in this city. Buildings of such inordinate height as are on the north-east corner of Spruce-street and Nassau-street, on the south-east corner of Fulton-street and Broadway, on the north-west corner of Fifth-avenue and Forty-second-street, and many others of similar height, ought not to be permitted.

Florence Nightingale observes: "A dark house is always unhealthy, always an ill-aired house. Want of light stops growth, and promotes scrofula, rickets, &c., among the children. People lose their health in a dark house, and if they get ill they cannot get well again in it."

Dr. Edwardes, of Paris, says the action of light tends to develop the different parts of the body in that just proportion which characterises the species; and that, in warm climates, the exposure of the whole surface of the body to the action of the light will be very favourable to the regular conformation of the body. Humboldt confirms this in the account of his voyage to the equinoxial regions: He says, "Both men and women (whose bodies are constantly inured to the effect of light) are very muscular, and possess fleshy and rounded forms. It is needless to add that I have not seen among these people a single case of natural deformity."

In truth, the light and heat and chemical influence of the sun's rays may be considered as the physical value of all vital power. The inestimable cause of light as an element in the preservation of health, and treatment of disease, should be fully appreciated in the construction of all streets and buildings, particularly those intended as habitations for the poor, or public hospitals for the treatment of disease.

At the present day it is entirely too soon to take extreme ground on any phase of the light subject. It is a subject which, in its practical phases, is but just undergoing experiment and observation. If I have in any way contributed to direct more special attention to its relation *to health in dwellings*, and therefore to architecture in general, I shall feel quite satisfied with my efforts.

In conclusion, permit me to add yet a few words of an eminent physician:—"Let the sun come into our dwellings, and let our chambers be on the sunny side of the house. A room that the sun is not permitted to look into at all should be without a door; it is unfit for human occupancy. Even the flowers will grow pale and be frightened to death in it. The primary object of a window is not for the sons of men to look out, but for the sun to look in. Pleasant sunshine not only brightens a man's buttons, but his heart; it makes his spirit as cheerful as the landscape: he cannot be happy without it."

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Water is the great element used against fire. Steam, under certain circumstances, is one of the best protections; so much so, that we now have first-class safes constructed on the principle of holding in reserve an ample amount of water to generate steam sufficient to act as a protection against fire. Carbonic acid gas is also used to a certain extent, but water is the most general and common agent in use, and this we propose to use by having a supply of it so stored as to be readily made available, and to act somewhat in the manner of steam, thereby keeping the temperature of the exposed parts so reduced as to prevent them from becoming heated enough to serve as a conductor to the more inflammable material within or beyond them.

We would build of brick, after the ordinary styles, using care not to introduce wood in such a careless manner as to neutralise the benefits of the system herein proposed. In the process of construction, we would leave a slight air-space, say 3 in. or 4 in., between our building and those on either side; or, where parties build together, make the party-walls hollow; this could be accomplished without showing any open space in front. For the interior supports, we would use hollow cast-iron posts, notwithstanding that in some of the great fires they were found to be insecure when exposed to a powerful heat, but we would make some slight changes in them, as will herein be described.

In this plan it would make no difference whether a French roof were adopted or not, so long as it was properly constructed. By the way, no French roof should be allowed on any building, and particularly on a high one, in a thickly-settled locality, unless it were constructed of iron, or in some way made fireproof. We would propose gas-pipes for the purpose, as being both light and strong, and as possessing the quality of being easily worked into any desired shape. Again, by the way, we would note the fact that a French roof, in reality, forms more of the side of a building than of the roof proper, the greater portion of it being flat, as the majority of other roofs.

In order to carry out our method, we would construct what is ordinarily termed a flat roof, with the addition of sides, as though we were forming a tank; these sides to be about 1 ft. high, and suitably strong for the purpose. They may be constructed in a number of ways. The covering to the roof to be of tin, and water-tight, and the roof itself capable of supporting, when required, the weight of an amount of water to the depth of about 1 ft. Where the roof is long, it would be well to have it divided by cross partitions into bays or sections, from front to rear; otherwise, as water will find its level, if there were a foot of water at the highest portion of the roof, at the lowest point there might be 3 ft. or 4 ft., which, for ordinary buildings, might be too much weight. These cross divisions would necessitate extra conductors, yet that would be a small item, and could be easily managed. If introduced, they should be slightly diagonal, and not straight across the roof, as that would be the most ready way to cause the water, in ordinary times, to run to a common point, the necessity for which would be readily understood by the practical man.

The tank need not be kept filled all the time, unless so desired, but it should be so connected with a water supply, by hydrants or force-pumps, that it could readily be filled at very short notice; and during the raging of a fire in the immediate vicinity, it should be kept full enough to overflow in small quantities over the sides of the building, and, if desirable, into the hollow iron posts. The ordinary conductor pipes should be arranged with a suitable turn-off valve, so that when the tank was filled the water would not be allowed to run off too freely, but be held in reserve for service. Up and down the sides of the building, in the side walls as well as in the front and rear, there should be arranged small troughs, which, in the design for the front (and rear if desirable), could easily be disguised as belt-courses, introduced into window-heads, &c.; also within the iron posts there should be places to catch and hold small quantities of water. These troughs, as well as the gutters, would hold the water, and the heat, if near at hand and powerful enough under ordinary circumstances to injure the building, would, where there was a constant supply of water, generate steam from it in sufficient quantity to enshroud the whole building, and afford it superior and ample protection.

In an iron front, this arrangement could easily be carried out, and at fires in the immediate vicinity of iron structures there would no longer be that peculiar danger which firemen realise to be so great. This method, it will be seen, would do away with shingle and slate roofs in commercial and block buildings, where it might most probably be introduced, though slate might still be used on the steeper portions of roofs where there would be a flat above for containing the tank arrangement.

In regard to churches and similar structures with high wooden roofs, they must either be built differently, be more isolated, or have fireproof bulk-heads built near them, else suffer the consequences of being built of inflammable material.

If all cannot afford to build in the manner described, it would be well for the municipal authorities of a city, in particularly inviting localities, to assist in building the fireproof bulk-heads, in the manner herein described, with their roofs so constructed as to be readily converted into a tank that should be abundantly supplied with water. Such bulk-heads, in the presence of a large fire, would convert into an enormous steam-generating institution, that would form a barrier that would arrest the flames and confine them within certain areas. These bulk-heads need not be worthless space, but be combined with some private enterprise; the city authorities, for the better protection of the city, allowing certain parties some bonus for thus making their building answer a double purpose, and, in addition to its private character, becoming a great public blessing. We think that a comparatively few such structures, judiciously distributed throughout a large city, would prevent such disastrous fires as those that have within the past few years occurred in some of our larger cities.

ISAAC P. NOYES, Architect.

Washington.

OBITUARY.

AT his country seat, Heavitree House, near Exeter, died on the morning of the 7th inst., Mr. William R. Gill, contractor, late of the Polygon, London.

Mr. Gill left Exeter as a poor lad many years ago to try his fortune in the metropolis, and with him, as with many others, untiring industry met with its reward, for he amassed a large fortune. Less than a year since he bought an estate near to his native city, and it was his intention, by curtailing his contracts, gradually to wean himself from business, and to spend quietly the evening of his days amidst scenes which were rendered dear to him by early associations. But it was not to be. He had hardly settled in his new abode when sickness set in, and after a couple of months of distressing illness,—bright and active in his intellect to the last,—he passed away on Saturday morning at the comparatively early age of fifty-four. Mr. Gill, especially through his connexions with the Midland Railway, was well known throughout England, and by the free and straightforward manner in which he on all occasions transacted business, was exceptionally popular with every class of men with whom he came in contact. His energy was unbounded, and he has been known on more occasions than one to spend an entire week of nights in a railway carriage, travelling alternately between London and the North. At the time of his death he had several important contracts in hand in various parts of the country, amongst which we may notice extensive works at Whitecross-street, E.C., for the Midland Company.

THE BATH CATASTROPHE.

THE inquest relative to the deaths of the victims of the Bath Bridge accident has been concluded. The coroner, Mr. English, in summing up, said grave responsibility rested somewhere; but he exonerated Mr. King, trustee under the marriage settlement of Mr. Isaac, one of the proprietors. The same irresponsibility, he considered, rested upon Mr. Issac, and if the jury considered Mr. Hicks was justified in treating the bridge as under the exclusive management of Messrs. Mitchell and Bruce, the former might be left out of consideration in attaching blame. It was for the jury to say whether there had been culpable negligence on the part of Mitchell and Bruce, and whether Tanner, the toll-keeper, might not have rendered himself chargeable by shutting the gate against the crowd, for to their detention was probably to be attributed the downfall of the bridge. In conclusion, the coroner expressed a hope that foot-bridges would be placed under Government inspection.

After three hours' deliberation, the jury returned a verdict of manslaughter against the four proprietors, Messrs. Hicks, Isaac, Mitchell, and Bruce, and against the toll-keeper, Tanner, all of whom were committed for trial at the Somersetshire Assizes, but allowed bail. The jury added to their verdict an expression of their strong opinion of the necessity for some legislative enactment to provide for inspection and supervision of foot-bridges intended for public use.

VALUE OF PROPERTY IN BERMONDSEY.

A SHERIFF'S inquiry was held last week at the St. George's Vestry-hall, Borough-road, to assess the compensation to be paid to Mr. Robert Allen, in respect of some house property in Lynton-street, Bermondsey, which the South-Eastern Railway Company wish to acquire for the purpose of extensions. The railway company find it necessary, for the purpose of their alterations, to acquire five houses, the property of Mr. Allen, which are held by him on a lease of seventy years. The total amount of rent received by Mr. Allen for the five houses, a stable, and a dairy, is 205*l.*, and, deducting ground-rents and losses, the total net annual value was 135*l.* Considering the character of the property, it was stated to be worth sixteen years and a half purchase, and allowing ten per cent. for compulsory sale, the amount claimed was 2,400*l.*, in addition to a further claim in respect of the depreciation of two houses which the company did not propose to take. In support of the claim, Mr. Joseph Dickens, surveyor; Mr. George Hawkins, a member of the Bermondsey Vestry; and Mr. George Elkington, surveyor to the Bermondsey Vestry, were called, and all of them stated that the property was worth the amount claimed, and that the value of property in the district was constantly increasing. The jury assessed the damages at 2,400*l.* for the five houses and the stable, but did not allow any compensation for the depreciation of the other houses.

BOSTAL HEATH AS AN OPEN SPACE.

THE Metropolitan Board of Works has agreed to purchase the manorial rights and interests of Bostal Heath, in order to convert it into an open space for the recreation of the public. The proposed purchase money is 5,500*l.* At the last meeting of the Board, on the report of the Parliamentary Committee recommending its purchase being presented, the recommendation was objected to by Mr. Roche, on the ground that the price proposed to be given for the land was excessive; but Mr. Fowler, architect, on the other hand, observed that he believed it was a very cheap purchase, and he was glad to think that the south of London was getting some of the good things in the way of open spaces which Hampstead and Finsbury had received.

THE TELEPHONE.

THE telephone, or musical telegraph, is an apparatus by means of which, according to its inventor, sounds of variable pitch can be conveyed from one place to another by means of electricity. The component notes of a melody can be sent along the wire and reproduced in proper order, distinctly and loudly, at the distant end. To transmit sound by the telephone the atmospheric vibrations have to be collected and transformed into electricity, which must then be sent along a wire in waves or impulses corresponding in their number per second to the atmospheric vibrations which are proper to the particular note to be reproduced. At the distant end these electrical impulses have to be re-converted into sound, and in this process lies the most novel part of the invention, Mr. Cromwell F. Varley having found means to produce what is nothing more nor less than musical thunder. A singer's voice may thus be transmitted along a wire, and heard afar off in the shape of miniature thunder.

Like all telegraphic apparatus, the telephone consists of two instruments, a sender and a receiver. On the 12th inst. both these were at the Queen's Theatre, so that both could be examined, and the wire was laid across to the Canterbury Hall and back, a distance in all of some three miles. In the public performances, of course, the sending instrument will be at one place and the receiver at the other. Let us con-

sider the receiver first, for it is in it that the greatest novelty of the instrument consists. The only thing visible to the audience is a large drum-head or tambourine, inside which is stretched what appears to be a sheet of tissue paper.

The sending instrument is more complicated. A number of tuning-forks, sufficient to enable a simple tune to be played by their means, are employed. Each of these has, mounted near its end, a small electro-magnet, worked by a battery, by which it is kept in constant vibration, precisely, to take a familiar instance, as the strike of an electric bell is kept going when the button is pressed down. The vibrations of the fork are then caused to make and break a second separate electric circuit. A number of keys, one for each fork, are mounted on a key-board, and they are manipulated just like pianoforte keys.

The experiment last week was not wholly successful, but seemed to give promise of a great result by and by.

WALTON BRIDGE.

THE trial of this case, at Maidstone, raised the question as to the liability to repair the greater part of the bridge or bridge-way between Shepperton, in Middlesex, and Walton-on-the-Thames, in Surrey, and it was of some interest from the antiquarian character of the facts on which it depended, and which went back to a period as remote as the invasion of the country by Julius Cæsar. It was a prosecution by the county of Surrey against the county of Middlesex, for not repairing that part of the bridge-way which goes over a tract of low-lying land or marsh on the southern or Surrey side of the river, which Surrey contends to be in Middlesex, while Middlesex insists that it is in Surrey. The spot in question, over which the greater part of the bridge-way extends, is called the Cowey, and it is at a part of the river where, as Camden showed, Cæsar passed the river, the place being that where the stakes the Britons fixed in the stream to obstruct him were found so long ago as the time of Bede (for which reason it was called "Cowey Stakes"), and where some of them continued to exist down to our own time. The *Times* gives a very interesting report of the case, but we cannot repeat it.

In the result, the jury said,—We find that the river has shifted its position, and that it once ran under the bank of Oatlands Park, but there is no evidence to show what the width of the river was at that time, or where the middle of the stream then was; and, therefore, we fix the boundary of the county at the middle point between the gravel bank on the south and the gravel bank on the north side, to be measured along the existing road.

The learned judge upon this finding directed the verdict to be entered for the prosecution.

The practical result of this will be, that the cost of repairing the bridge will be pretty evenly divided between the two counties, one repairing the bridge over the water-way, and the other the bridge road over the marsh land called "The Cowey."

THE HOUSING OF THE CITY POLICE.

GREAT dissatisfaction prevails among the members of the City of London police force, on account of what they deem to be an arbitrary rule compelling them all to reside within the City boundary. Some few weeks ago a petition was presented to the Chief Commissioner (Col. Fraser), in which attention was drawn to the arbitrary character of this rule, and praying him, so far as married constables were concerned, to permit them to reside in the metropolitan area; further, it was pointed out that the almost daily demolition of house property in the City rendered it impossible to obtain adequate accommodation, whilst the rise in the rents put them entirely beyond the reach of the men. To this request the Commissioner replied "that the wives and families of the married officers might reside wherever they chose, but in the event of their removing, the husband must reside in the single men's quarters at the various police-stations in the City." To this the married men reply, in effect, "Thank you for nothing, for if we avail ourselves of your permission to do that which we were at liberty to do without asking you, we shall have to pay double rent." The single men in the force, who are domiciled in the station buildings or barracks, complain of the inadequacy and unhealthiness of the apartments they have to occupy, and allege that some of the best rooms in the newly-erected buildings are monopolised by effete inspectors who have seen thirty years' service, and who ought to be pensioned off. A strike is threatened by the men, although it is hoped that by appealing from the decision of the Commissioner to the Court of Aldermen some amelioration of the grievance may be conceded.

THE FALL OF GIRDER AT FINSBURY PARK STATION.

DR. HARDWICKE has held an inquiry, at the Islington Vestry-hall, as to the death of James Henry Essex, aged 57, of 42, St. Thomas's-road, Finsbury Park, who was crushed to death on Saturday morning, by the falling of a girder which was being thrown over the Seven Sisters-road railway-bridge, for the Great Northern Railway Company, by Messrs. Pitts & Binner, of Stanningley, near Leeds, the contractors. During Friday night wooden piers were erected in the road, and the girder was successfully raised to its position by means of hydraulic power, when by some means or other it toppled over and fell into the roadway, killing deceased on the spot, and fearfully injuring another person.

Mr. Johnson, chief engineer of the Great Northern Railway, said the girder was over 20 tons in weight, and was being placed in its position in the usual manner. He had the greatest confidence in the contractors, who had built a large number of bridges without any fatal accident. He thought the contractors had done what was for the best, but people were always wise after the event.

Mr. W. Pitts, who had charge of the work, in answer to questions, detailed the method adopted to get the girder into its place. The girder having been raised to its place the danger was supposed to be passed, and he could not account for the occurrence except on the supposition that the "jack," on which the south end rested, had given way and had lowered.

Matthew Pitts, one of the contractors, who was on the spot at the time of the accident, also tendered evidence in explanation, stating that his firm had built hundreds of bridges, and had raised girders 75 tons in weight, by pursuing the exact method adopted in this case. He spoke from twenty-two years' experience. They did not consider it necessary to stop the traffic. The girder was propped up on either side to the time of the occurrence. The props, however, were only a precaution.

Mr. Cormack, surveyor of the parish roads, said that on a former occasion of placing girders application was made to erect scaffolding. On the ground of public safety he thought the traffic should have been stopped.

At the conclusion of the evidence,

The Jury consulted for a considerable time, and then agreed to a verdict of "Accidental death," with a recommendation that in all future works of a similar description the traffic should be wholly suspended until the girder was safely fixed, and that the girder should be supported in the centre

TENDER IRREGULARITIES.

FALMOUTH SCHOOL BOARD.

A MEETING of the Falmouth School Board was held on the 9th inst. Present—Messrs. G. H. Fox (chairman), Truscott, Lean, Rundell, Carlyon, and Hicks. At a previous meeting of the Board, the tenders for the erection of a school at Webber's-hill were opened. Mr. Roberts's price was 1,969*l.*; Messrs. Olver's, 1,919*l.*; and Mr. Halligey's, who worded his tender merely as an estimate, 1,455*l.* The Board was scarcely satisfied to receive Mr. Halligey's as a legal tender, but it was proposed to accept it, and the clerk was instructed to see Mr. Halligey to sign the necessary form to forward to the Educational Department. On the clerk seeing Mr. Halligey, it was ascertained that his son (in the father's absence) had worded his supposed tender as an estimate purposely, and on his going through it he proposed to amend it by making it 1,787*l.* At the meeting this tender was received, but one or two members were of opinion that Mr. Halligey's tender ought not now to be considered. After some discussion it was agreed to ask Messrs. Olver, and in the event of their refusing, to ask Mr. Roberts, if they would reconsider their figures, and see if they could not do the work at Mr. Halligey's price.

We quite agree with the editor of the *West Briton*, who points out, in an excellent leading article, the irregularity and injustice of the course pursued by the Board:—"It must be obvious to every person in business," says the writer, "that if public bodies were to treat tradesmen in this way often, there would be an end to tendering. In the first place, it costs a great deal of time and trouble, and even expense, to get out an estimate, and in the next there is intense competition. Just now materials and wages are so high that there is very little margin left for profit. It is most essential that public business should be transacted in the most straightforward and honourable manner, especially in municipal institutions, else all confidence will be lost in them, and we hope the example of the Falmouth School Board will never be followed by any other body in the country."

We are not surprised to hear that both Messrs. Olver and Mr. Roberts have declined the offer, or to make any abatement. The only proper course open to the Board is to accept Messrs. Olver's original tender.

MASTERS AND MEN.

Falkirk.—The journeymen slaters in Falkirk and vicinity struck work a few days ago for an advance of ½d. per hour. The wage paid was 8d. per hour.

Keighley.—The *Bradford Observer* is informed that a meeting of the master builders of Keighley was held on the 3rd inst. to discuss the action of the masons and labourers of that town, who have struck work for an increase of wages, and after giving it their careful consideration, they unanimously refused to grant the advance asked for, and adjourned the meeting to that day fortnight.

Glasgow.—The strike and lock-out of ship-carpenters and joiners at Glasgow still continues. The Glasgow correspondent of the *John O'Groat Journal* says:—"The Dutch carpenters brought here a few weeks ago, may be said to be actually incarcerated. They are completing a vessel in one of the yards on the Clyde; and for this purpose, to avoid contact with the 'strikers,' are never allowed outside the yard gates. The men are working Dutch hours, from five a.m. to seven p.m. at 7d. per hour. It is said that their workmanship is quite up to the mark; but that they believe in being slow and sure. About the laying of a plank, there is generally much talk. The time they spend in planning the execution of a thing would be taken advantage of by Scotchmen in doing it; hence it is said that a Clyde carpenter will do as much work as two of the Dutchmen."

Edinburgh.—At a meeting of the Edinburgh painters on the 14th inst. an investigation Committee of the Manchester Alliance of Painters reported that it was hopeless to continue the strike, and intimated that the support of the Alliance would be withdrawn. The men had struck work for an increase of ½d. an hour, and the Alliance had expended 350*l.* in their support. The meeting resolved to terminate the strike, which has continued six weeks.

Weston-super-Mare.—The master builders and contractors throughout the Weston-super-Mare district have conceded the demands of the labourers for a general advance of 2s. 6d. per week, and a reduction of one hour's labour on Saturdays, making the men's wages 1*l.* 2s. 4d. for a working week of fifty-six hours and a half. Several hundred labourers have now resumed work.

Darlington.—The operative plumbers of Darlington have waited upon the masters and intimated their willingness to resume work on the masters' terms, thus withdrawing all claims made by the men in October last. The strike, which has lasted upwards of nine months, is now settled.

Manchester.—At the Manchester City Police Court, John Yates, James S. Murchie, and Thos. Phillips, officials of the Manchester and Salford Carpenter and Joiners' Union, were charged on remand, with causing an obstruction at the London-road Station on the 16th ult., and intimidating certain workmen who had arrived in Manchester to take the place of others on strike. The latter charge was withdrawn, and for the former offence Mr. Headlam fined Phillips 3*l.* and Yates and Murchie 1*l.* each, or one month's imprisonment. The money was paid.

A County Court Judge on Strikes and How to Avoid them.—Mr. Smith, Q.C., judge of the Madeley County Court, in giving judgment in some petty undefended cases, remarked that the present state of trade was most deplorable, but he hoped that a revival would take place. He had upon other occasions expressed his own opinions upon the subject, and had suggested a remedy for the causes which had produced it. The cause of the present depression was undoubtedly the fluctuations consequent upon the high rate of wages which prevailed a short time ago. Men seemed to think that they had only to make sufficient noise and demand higher wages to obtain them. They sent up the price of labour, and drove the iron trade out of England to Belgium and other places, and the coal trade being in a measure dependent on that of iron, shared in the depression. He some time ago pointed out to the Government and also to the influential em-

ployers of labour who approved of the suggestion, a scheme which he believed would have the effect of preventing such a disordered state of things, and obviate strikes, which were at the bottom of the evil. His plan was to construct a court, at which both masters and men should be represented, and the whole circumstances of the trade stated by able men. Such tribunals should have the power to fix the price to be paid for labour and of enforcing it, and not more than two men should be allowed to meet and conspire to alter that price. A legal vent would thus be given for a statement and discussion of views on both sides as regarded the price to be paid for labour of all kinds; no one should pay more and no one should receive and pay less. At present it was not so much a question of right as one of might—might on the part of either men or masters, and the latter being capitalists, capital in the long run had the best of it. The standard being fixed in the way he suggested, no one should be allowed to depart from it. He hoped sincerely that better times would dawn, and believed that the iron and coal trade would come back to this country, and he trusted more discretion would be exercised in not doing that which may drive them away.

DISREGARD OF AN INJUNCTION.

DE BOLLA *v.* TEAPE.

THIS was an action in the High Court of Justice (Chancery Division) by a restaurant keeper to restrain the defendant from raising a certain wall adjoining his premises above a certain height. An injunction was granted on the 30th of April to stop the building.

Mr. Higgins, Q.C., now moved to commit Mr. Bracher, the builder, for contempt, in continuing the building, notwithstanding the injunction.

Mr. Glasse, Q.C., and Mr. Field appeared for the defendant.

The Vice Chancellor decided that Mr. Bracher had disobeyed the order of the Court; but as the plaintiff did not press for his committal to prison, he should merely order him to pay the costs of the motion.

INCORRECT QUANTITIES.

A CASE of some interest was tried before Mr. Serjeant Petersdorff, at the Bideford County Court, on the 9th inst., when Mr. Harry Hems, architectural carver, of Exeter, sued Mr. Frank Squires, statuary, of Bideford, for 3*l.*, the balance of 6*l.* 10*s.* for work done.

It appeared from the evidence that in June of last year defendant wrote plaintiff asking him what he would carve four finials 12 in. square and a few bosses in Bath stone for at his yard. Plaintiff agreed to do these for 3*l.* 10*s.*, and the work being pressing, sent at the defendant's request a couple of men immediately to Bideford to do it. The stones were then found to be much in excess of the sizes quoted, and in due course a bill for 6*l.* 10*s.* was sent in. This defendant declined to pay, alleging that 3*l.* 10*s.* was the price agreed.

Mr. Venus Willmott deposed that he was a foreman in Mr. Hems's employ. He received instructions to go to Bideford to do half a dozen finials 12 in. square. The finials Mr. Squires gave him to do measured respectively on each,—1 ft. 4 in. by 1 ft. 10 in.; 2 ft. 6 in. by 1 ft. 7 in.; 1 ft. 10 in. by 1 ft. 7 in.; and three more 1 ft. 10 in. by 1 ft. 4 in. He pointed out the descrepancies in size to defendant, who promised if they were found to be in excess to pay any fair charge.

Sebastian Lucas, also in the employ of the plaintiff, corroborated this, and stated further, that he "subbed" 2*l.* 10*s.* on account, and his companion 1*l.* from Mr. Squires a day or two prior to the work being completed.

Defendant maintained that a bargain was a bargain, and argued that although the finials might have been larger than the 12 in. he specified, yet, in carving a foot or two of excess stone was nothing worth speaking of.

The Judge said it was evident from the bare fact that defendant "subbed" plaintiff's men 3*l.* 10*s.* before the work was completed that he could not have been under the impression that that sum was to defray all expenses. Evidence had proved plaintiff had actually paid in wages the whole of the sum now claimed less 14*s.* or 15*s.*, and he considered the bill an exceptionally moderate one. He gave for the plaintiff for the full amount and all costs.

A Natural Bridge, said to be far more wonderful than that in Virginia, is reported to have been recently discovered in Elliot county, Kentucky. It is of solid stone, in form a magnificent arch, 162 ft. long, and 15 ft. wide at the top, the river, the Little Chaney, rolling 100 ft. below. Fifty yards above the bridge is a waterfall, 60 ft. high, and the view from the bridge is said to be extremely beautiful.

GROUNDLESS CHARGE AGAINST A CIVIL ENGINEER.

AT the Berkeley Petty Sessions, Mr. William Fontaine Bruff, of Sharpness and Lydney, civil engineer, who has been engaged superintending the construction of the Severn Bridge Railway approaches, surrendered to his bail to answer a summons charging him with having, at the parish of Berkeley, feloniously stolen certain moneys of John Brown, of Maida-vale, Middlesex, gentleman.

The case was originally before the court on Wednesday, June 20th. Mr. Algernon Tathum, of the firm of W. Tathum & Sons, London, appeared in support of the summons; and Mr. Cooper, of the firm of Cooper & Cars, London, represented Mr. Bruff.

Mr. Tathum said that at the preliminary examination Mr. Tibbits appeared on behalf of Mr. Brown, but since then changes had been made, and he (Mr. Tathum) now represented Mr. Brown. He had gone into the matter thoroughly, and he had come to the conclusion that the prosecution ought never to have been instituted. He believed the accounts between Mr. Brown and Mr. Bruff had been muddled up together. He believed the criminal charge could not be sustained, and he begged to retire from the prosecution.

Mr. Cooper said a very serious charge had been brought against his client, and it was one that never ought to have been brought, and he gave a most unqualified denial to it.

Mr. Scott (magistrates' clerk) observed that he had read through the depositions and the papers that had been put in, and he could not see the slightest evidence of felonious intent.

The summons was then withdrawn, and the parties left the court.

CASES UNDER METROPOLITAN BUILDING ACT.

EXEMPTION OF RAILWAY COMPANIES.

AT Greenwich Police-court, Mr. John Shaw, manager and secretary to the South-Eastern Railway Company, was summoned for a contravention of the Metropolitan Building Act, in having erected a building as stabling, erected partly of wood and open, and not of brick, stone, or some incombustible material. Mr. Colman, from the solicitor's department of the Company, attended.

The complaint had been made by Mr. Tabberer, the surveyor for the Greenwich district, and the summons had been adjourned for the magistrate to view the structure previously to giving judgment. It was given in evidence that for several years past Mr. Munyard, a cab proprietor, had been in occupation of a wooden structure in an enclosed yard at the Greenwich terminus, but that on the extension of the line to Woolwich, now nearly completed, the old station had been demolished as well as the old yard, and the stabling used in the old yard removed to other land near the new station, for the purpose of enabling Mr. Munyard to provide proper cab facilities for the accommodation of passengers. In opposition to the Company's claim of exemption, two cases heard at the Hammersmith and the Thames Police Courts were put in, where the magistrates (Mr. Bridge and Mr. Lushington) had decided against the two railway companies. In the Hammersmith case, the buildings complained of were the erection of thirty houses for the dwellings of railway servants, and the other of a wharf, being let by the Great Eastern Railway Company to a coal merchant as a depôt, from the sale of which coals a profit was made by the holder.

Mr. Balguy said he had viewed the stabling in question, and recognised it as the old building he had seen for some time in the old yard. In the cases cited the houses and the wharf did not add to the development of railway traffic, and it came within the provisions of the Act; but the providing of cab accommodation, which was carried on at many railway stations, facilitated such traffic, and he should dismiss the summons, formally adjourning such judgment for a week for the district surveyor to consult the authorities of the Metropolitan Board of Works, and to make an appeal against such decision.

NEW FONTS.

Worcester.—A new font has been erected in St. Andrew's Church, Worcester, in memory of the late Alderman Webb. It is of Caen stone, with devices carved thereon of a dove, ornamental cross, emblem of the Trinity, and the sacred monogram. Marble columns, with carved capitals and ornamental bases, support it. The font was designed by Mr. W. Forsyth, and executed on his premises.

Dungannon.—A memorial font (designed by Mr. Butterfield, architect), standing 5 ft. high from the base, has just been placed in St. Ann's Church, Dungannon. It is composed of eleven different kinds of marble,—Irish, English, and foreign, and also of Scotch. The bowl (upon which there is an oak cover) is octagonal. The eight panels all vary in design, and the figures between each are carved. At the top there is the following lettering made with Lieva marble:—"To the glory of God,—the beloved Memory of Granville Henry Stuart, Earl of Ranfurly." The bowl is supported by a die and eight columns (the green being Galway marble). The lower or kneeling step is of Aberdeen granite; next there is one of white marble. The font was supplied by Messrs. Henry Poole & Son, of Westminster.

Brighton.—A font is about to be placed in St. Peter's Church, Brighton, in memory of the late incumbent (the Rev. Thomas Cook, M.A.), at the cost of Mrs. Cook. The font, which has been designed by Mr. Somers Clarke, jun., will be in the Perpendicular style, corresponding with that of the church. Messrs. Bennett, of the Lewes-road, Brighton, have been entrusted with the work, and they have secured a block of Sussex marble, dug out of the Lanfields estate at Petworth, and weighing nearly five tons.

CHURCH-BUILDING NEWS.

Kirkdale.—The foundation-stone of a new church in the district of St. Mary's, Kirkdale, dedicated to St. Athanasius, was laid on the 25th ult., by Mr. A. H. Brown, M.P. The site, which has been given by the Earl of Derby, who has also promised 1,000*l.* towards the endowment fund, is at the junction of Fountains-road and Fonthills-road. The cost, exclusive of the boundary-walls, will be 6,000*l.* The plans have been prepared by Mr. Henry Sumners, architect. The building will accommodate 750 persons on the ground-floor, and will consist of nave, 82 ft. long by 31 ft. wide, north and south aisles, north transept, chancel, 26 ft. long by 27 ft. wide, minister's vestry, choir vestry, and organ-chamber. The church will be built of the local red sandstone in shoddies, with worked dressings, the style of architecture being Geometric Gothic of a simple character. Provision has been made for a spire and tower to be added at a future time. The builder is Mr. James Leslie, Bootle.

Beverley.—The memorial-stone of a new church was laid at Beverley on the 29th ult. by the Dowager Lady Wolverton. The late Lord Wolverton in his will bequeathed the sum of 5,000*l.* towards the cost of the erection of a church in memory of his son, Richard Riversdale Glyn, who died at Arden in 1859. To that sum Lady Wolverton has added 2,000*l.* from her own funds. The new church will be erected near the site of the old one, the ground having been obtained in exchange for that on which the ancient edifice stood. The style of architecture chosen by Mr. J. S. Crowther, of Manchester, who was entrusted with the preparation of the plans, is Geometric Gothic. The exterior walls will be built of Whitby stone with Bradford stone dressings; while the interior walls are to be faced with red brick. The church is to consist of nave, north and south aisles, two vestries,—one for the clergy and another for the choir,—organ-chamber, chancel, narthex, and a porch at the south end. This porch will be surmounted by a tower and a spire, which will have an altitude of 175 ft. The total length of the church, exclusive of the narthex, is 101 ft. 8 in., the width of the nave and aisles being 48 ft. The dimensions of the chancel are 38 ft. by 23 ft. 6 in. The present contract, which is let to Mr. A. Richardson, of Beverley, does not include the construction of the spire, but the tower will be erected, and will be finished with four pinnacles. The seats will be open benches of pitch pine, and accommodation will be provided for 300 persons. Mr. Dickinson is clerk of the works. The cost of erecting so much of the present church as is now contemplated will be 8,000*l.*

Guyhirn.—The memorial-stone of a new church at Guyhirn has been laid. The site, which has been given by the Vicar of Wisbech, is only a few minutes' walk from the Great Northern Railway Bridge. In digging for the foundation a quantity of stone was found, and it is believed that the site was once occupied by a church which is said to have existed in Guyhirn more than 300 years ago. The new church will be built in the Early Gothic style, and will consist of a nave and chancel, the transept forming the vestry on one side, and having seats for children on the other. Sir Gilbert Scott is the architect. The estimated cost is 3,150*l.* The length of the building from east to west will be 85 ft.; the width will be 25 ft. across the nave, and 47 ft. across the transept. The material used will be white Whittlesey brick, with stone weatherings. There is to be a turret with three bells. The builders are Messrs. W. Girling & Son, of Wisbech.

Art Exhibition at Bradford.—Two of the rooms in Manningham Hall, Bradford, have been set apart for the Bradford Art Society's Exhibition, which has just been opened. The exhibition contains about 170 different works, mostly water-colour drawings, many of them the work of amateurs.

"SCIENTIFIC PHILANTHROPY (LIMITED)."

A SUGGESTIVE commentary on what has recently been said in our columns and elsewhere as to the management of Artisans', Labourers', and General Dwellings Company is afforded by recent proceedings at the Bow-street Police-court, where William Swindlehurst, the secretary and manager of the company, and Edward Saffery, described as an estate agent, of Essex-street, Strand, have thrice appeared, charged on warrants, before Mr. Vaughan, with conspiring to defraud the shareholders of the Artisans', Labourers', and General Dwellings Company of the sum of 30,000*l*. In the first instance, Mr. Douglas Straight prosecuted on behalf of the committee of investigation appointed by the company, and Mr. Poland appeared for the defendant Swindlehurst.

Mr. Straight, in opening the case, said it was recently found necessary to appoint a committee of investigation into the affairs of the company. It then appeared that the defendants,—Saffery acting as "middle man," or intermediate vendor,—had contrived to defraud the company in the following manner:—The company, whose object was to purchase estates for dwellings for the poor, had paid 28,000*l*. for the Shaftesbury Park Estate, when only 25,000*l*. had been really received for the same; 48,000*l*. for the Cann Hall Estate, when only 35,000*l*. had been received: making a difference of 13,000*l*. A difference of 17,000*l*. was made also in respect to the sale of a third estate. These moneys, it was alleged, had been participated in by the defendants, and Swindlehurst suddenly resigned his appointment, and made preparations, it was believed, for absconding. Evidence in support of the charge having been given by the Hon. Evelyn Ashley, M.P. (one of the committee of investigation), and by Mr. John Morris (of the firm of Ashurst, Morris, & Co.), the case was remanded, the magistrate agreeing to accept bail to the amount of two sureties in 500*l*. for each of the prisoners.

At the adjourned hearing of the case on the 10th inst., Mr. G. Lewis, who now attended for the prosecution, said some additional facts of great importance would be disclosed in this inquiry, but he proposed, on the present occasion, to deal exclusively with the purchase of what was called the Queen's Park Estate, in the Harrow-road, which was offered for sale by the Messrs. Driver, the well-known auctioneers, in April, 1874. The property was divided into five lots, but only one lot (lot 2) was sold. Subsequently negotiations were commenced by Saffery for the purchase of the other lots, on behalf, as he represented, of "a building society." Agreements were made for the purchase of lots 3, 4, and 5, on condition that the purchasers of lot 2 (Messrs. Kelly) would surrender their interest therein, which they consented to do for a sum of 4,000*l*. beyond the amount of their purchase, 10,000*l*. Saffery was, for obvious reasons, represented as the equitable purchaser, although no contract existed to show the fact, and the large profits made by the re-sale of the estate to the Artisans' Company would be traced to the possession of the two defendants, and, he regretted to add, to one of the directors of the company, one of the 500*l*. bank-notes paid having been paid into his banking account. It would be thus seen that the secretary of the company, who was paid a salary of 500*l*. a year to protect the interests of the undertaking, had been a party to the appropriation of more than 8,000*l*.—that being the amount of difference between the price actually paid to the owners of the property (All Souls' College, Oxford) and that charged to the company—a further deception having been practised by another officer in the false valuation of the same.

Mr. Robert Collier Driver, the well-known auctioneer and land agent, of Whitehall-place, and Mr. Charles Needham Longcroft, the solicitor of the company, having given evidence for the prosecution, the case was again adjourned, the magistrate increasing the bail of Swindlehurst to two sureties in 1,500*l*. each, and himself in 2,000*l*. The same bail as before for Saffery was taken, viz, two sureties in 500*l*.

The case came on for hearing again on Wednesday last, when the chairman of the Board of Directors, Dr. Baxter Langley, was charged on a warrant with participating in the fraud. Mr. Lewis said that since the last occasion Dr. Langley had been charged with conspiring with the other defendants to defraud, and also with having, as a director of a public company, received property for his own interest. Out of the money received for the Queen's Park Estate a certain sum had been received by Dr. Langley, whether from Mr. Saffery or Mr. Swindlehurst, it could not be said; but a 500*l*. note had been traced to Dr. Langley, who had also possessed himself of 100*l*., whether from Mr. Saffery or not could not be said. Mr. Lewis said it would be shown that certain notes received from the Cann Hall Estate had been paid by Dr. Langley into his bankers. Dr. Langley, as the paid chairman of the company, could not have honestly received back portions of the money. Mr. Langley resigned his chairmanship a few days ago, with other directors.

After voluminous evidence had been tendered in support of the charge, the case was adjourned, the same bail as on the last occasion being taken for Swindlehurst and Saffery, and one surety of 500*l*. for Dr. Langley.

ST. JAMES'S, MOORE PARK, FULHAM-ROAD.

ON Saturday last the new chancel lately added to this church was consecrated by the Lord Bishop of London.

Seven years ago, when the church was erected, funds could be provided adequate only to the building of the body of the church, leaving the chancel, organ-chamber, &c., to be added when means could be acquired. Since that time, the vicar, the Rev. W. H. Denny, has been untiring in his efforts to consummate his good work, and Saturday saw the realisation of his wishes.

The chancel, apsidal in form, is from the drawings of Mr. Ewan Christian, and forms an elegant adjunct to the church, which was originally designed by Mr. Butterfield. The carved work has been supplied by Messrs. Jones & Willis, and the mural decoration, which is very successful, has been carried out by amateurs of the neighbourhood, the least indefatigable of whom certainly not being Mrs. Denny herself.

Five stained-glass memorial windows, by Messrs. Pepper, have been added,—three at the cost of the vicar, and the other two by one member of his congregation. We may add, personally knowing the difficulty in obtaining funds locally for this purpose, that although the work is completed a heavy debt remains, and to those of our readers who may be disposed to assist in its liquidation, we will simply suggest that Mr. Denny's Vicarage adjoins his church.

SCHOOL BUILDING NEWS.

Sneinton.—An extension of the Sneinton National Schools has been opened. Mr. J. Trueman is the architect, and Mr. Vickers the builder of the extension, which is calculated to accommodate 300 boys, and has cost 1,200*l*. The land was the gift of Earl Manvers. One of the features of the new department is a special class-room, set apart for middle-class education. There is no provision for girls, who are retained in the old schools. The old boys' schools are now applied for the infants. The original schools were erected for 600 children, and thus accommodate 900, with the addition.

Bradford.—The trustees of Eastbrook Chapel are now engaged in erecting new day and Sunday schools, in place of those which now stand in Chapel-street, Leeds-road. The new buildings will be upon an extensive scale. Only a small portion of the site of the present school premises will be required, as it is intended to build upon the enclosure adjoining Eastbrook Chapel. Upon this frontage will be placed the Sunday school, morning chapel, &c., and across the upper end of the ground, joining up to the old schools, will be situated the day school, the two schools having together a frontage of about 150 ft. to Chapel-street. Upon the ground-floor, next to the present chapel, will be the morning chapel, 37 ft. 6 in. by 33 ft. 6 in., and six class-rooms. The Sunday school will be upon the first-floor, its dimensions being 55 ft. 6 in. by 37 ft. 9 in., with six other class-rooms, four of which open upon the principal room by means of revolving shutters. The additional area thus obtained will give a total length to the school-room of 85 ft.

Whitechapel.—On the 12th ult. was laid the foundation stone of a German school in connexion with the German Lutheran Church in Little Alie-street, Goodman's-fields, intended for the benefit of the German population in the East of London. The schools were originally opened in 1805 with seventeen scholars, the number of which had increased last year to 495. In consequence of the dilapidated state of the school buildings, the Metropolitan Board of Works had ordered them to be pulled down. In their place it is intended to erect a school to accommodate 600 children, at an estimated cost of 5,000*l*. The architect is Mr. E. A. Grüning, and the builders are Messrs. Browne & Robinson.

Glossop.—New classrooms, &c., are in course of erection at St. Andrew's Church Sunday-school, Hadfield, Glossop. The cost of the extension will be about 700*l*.

Bristol.—The foundation stone of a new building for the Bristol Grammar School, in Tyndall's Park, has been laid. The building will be erected in the style of architecture prevalent in England in the time of the founder, namely, the latter part of the fifteenth century, will be placed upon the upper part of the land, and will present two fronts of very similar character, one of which will be seen from the Queen's Hotel-avenue. The ground-floor will contain, besides the entrance-hall and room for boys' caps, &c., the head-master's rooms, and the masters' common rooms, and eight class-rooms, each averaging 20 ft. square. The laboratory of the natural science classes, and other offices, will be placed outside the walls of the main building. The upper floor will contain the great schoolroom, measuring 140 ft. in length by 50 ft. in breadth in clear of the walls, and 50 ft. in height from the floor to the collar-beam of the roof. It will be lighted by eight large moulded tracery windows on each side, besides the great oriel window of the transept, and at the ends by traceried windows of seven lights filling the gables. A commodious residence for the head-master will be erected, in the same style, on the northern side of the school building. The building is estimated to cost 18,000*l*. Messrs. Foster & Wood, of Bristol, are the architects; Messrs. Wilkins & Son, of Bristol, the builders; and Mr. G. Salmon, clerk of the works.

Portland.—New Wesleyan day and Sunday schools are now in course of erection at Tophill, Portland. The cost will be about 1,000*l*. Mr. J. P. Scriven is the architect of the building. It is Gothic in style, built entirely of Portland stone, and is calculated to hold about 300.

Abbot's Bromley.—Two years ago the foundation stones were laid of some new school buildings, and a school chapel, to be erected in connexion with St. Anne's Middle-Class School for Girls at Abbot's Bromley. The portion of the chapel first proceeded with was the apse or sanctuary, and the choir, which were dedicated on the 26th ult. Inside, the building is some 30 ft. long, 20 ft. wide, and 50 ft. high, to the apex of the roof. An arch (of wood resting on stone shafts) of lofty proportions separates the curved and boarded roof of the sanctuary from the open-timbered roof of the body of the chapel. The windows are simply treated, and of two lights. The whole is built of local red brick, specially made to a thickness of only 2 in. The ultimate intention is to line the walls of the sanctuary with stone and bands of alabaster, with a reredos in the centre bay, consisting of three moulded arches, in which, carved in red stone, will be the Crucifixion, with St. Mary and St. John. Flanking the reredos on the side walls will be figures of saints under projecting canopies,—three on either side. The choir has been erected at a cost of about 800*l*. The architect is Mr. R. Herbert Carpenter, and the builders Messrs. Espley & Sons, of Stafford.

Poslingford.—The foundation-stone of new National Schools at Poslingford has been laid. The buildings have been designed by Mr. A. A. G. Colpoys, of St. Leonard's-on-Sea. They are intended to accommodate seventy children, and will contain a large mixed schoolroom, 30 ft. by 18 ft.; a class-room, 16 ft. by 12 ft.; and a residence for the mistress, having four rooms and offices. The contract has been taken by Messrs. Mason & Son, of Haverhill, and the total cost of erection is estimated at about 800*l*.

Edinburgh.—The foundation-stone of the buildings about to be erected in connexion with All Saints' Episcopalian Church, Lauriston, was laid on the 18th ult. The new building is situated at the south end of Glen-street, Lauriston, and adjoins All Saints' Church. The front elevation is Gothic in style, with a sloping roof, and is three stories in height. The second floor of the new erection is designed as a hall, to meet the growing wants of the neighbourhood. The new hall will measure 53 ft. by 35 ft., a space which, with the gallery to be added, will accommodate 500 or 600 persons. The entire cost is estimated at over 4,000*l*.

Poole.—New Congregational Sunday Schools

are being erected in Poole. The erection will be faced with red brick, with white brick arches and string courses, and will be supported by piers on either side. A schoolroom and two classrooms will occupy the ground floor, and the former will be approached from Lagland-street and by an entrance in Skinner-street. The dimensions of the schoolroom, measuring from the inside, will be 60 ft. by 38 ft., and of the classrooms 24 ft. 6 in. by 13 ft. respectively. These rooms will be of the uniform height of 16 ft. Mr. J. Dunford is the builder.

Margate.—The Dane Voluntary Schools, Margate, have lately been completed and opened. The buildings have been erected to accommodate 420 children. They are built in two flats, the girls having the ground floor and the boys the upper floor. The girls' schoolroom is 75 ft. long by 20 ft. broad, with two good classrooms; the whole capable of accommodating 260 girls. The boys' schoolroom is 45 ft. by 20 ft., and two classrooms; the number of boys it will accommodate is 160. Both schools have entrance-lobbies for hats and cloaks, and separate sanitary arrangements. The work has been carried out by Messrs. Bushell & Sons, from the designs of Messrs. Drowe & Bower, at a total cost of 1,880*l.*

Books Received.

On Hospital Organisation, with Special Reference to the Organisation of Hospitals for Children. By CHARLES WEST, M.D. London: Macmillan. 1877.

DR. WEST occupies a high position among his professional brethren. He has filled the office of senior censor of the Royal College of Physicians; and is president of the Royal Medical and Chirurgical, and also of the Obstetrical, Societies of London, and a corresponding member of the French National Academy of Medicine. Five-and-twenty years ago he founded the Children's Hospital in Ormond-street, to the care of which a very considerable portion of his valuable time has been steadily devoted. The little work which he has now published has the double aim of serving all hospitals, and all those who serve, manage, or direct hospitals, by offering them in a very available form, the fruit of a long experience; and of benefiting the Children's Hospital in especial by the proceeds of the sale of the book. Into the details given by Dr. West we cannot, of course, enter. But there is not a page which does not betoken the careful reflection of a scientific man who has his heart in his work; and not the heart alone, but that without which zeal may do more harm than good,—a cultivated brain also. Especially is the work of value to the managers and committee-men of hospitals, as showing very clearly what are the true laws of the division of labour and of responsibility between staff and committee; and what should be the general outline of the working arrangements. Valuable statistical details are given, as to the cost of a patient in both English and Foreign hospitals. It certainly is matter for serious reflection, on the part of those whom it concerns, that while the cost of a patient per day at the London Hospital is 3*s.* 4*d.*, and at the Westminster Hospital, 3*s.* 7*d.*, at the Children's Hospital it rises as high as 4*s.* 9*d.* We gather, from the close of the book, that the counsel of the founder is no longer dominant in Ormond-street. The comparison of cost just made shows that there is some considerable room for reform in the management of that beneficent institution. Dr. West speaks simply and weightily when he says:—"The medical report and the treasurer's balance-sheet furnish the test of the good working of a hospital. If the mortality is excessive, if the expenditure is extravagant, there is something wrong, something which must be set right,—considerately always; quietly, if possible,—but which yet must be set right, cost what it may."

The Cottage Hospital: its Origin, Progress, Management, and Work. By HENRY C. BURDETT. London: J. & A. Churchill. 1877.

THE commencement of this movement had our aid; each fresh foundation was recorded; and though the writer of the little volume before us does not include the *Builder* in the list of agencies which contributed to extend the movement, we have the satisfaction of knowing that observations in our columns admittedly prompted to action early workers in the cause. There are now nearly 200 cottage hospitals in the country, with an income of some 50,000*l.* a year. The great feature to be recognised in the system is the requirement of a moderate payment by the patients, thus encouraging feelings of self-help and independence. We cannot resist the conviction that our great hospitals are great pauperising centres.

Mr. Burdett's book contains much valuable information on the subject, and may be usefully studied as well by those who are connected with existing cottage hospitals as by those who project the foundation of one. To the latter we would especially advise simplicity and moderation. The Ross Memorial Hospital, which, as mentioned by Mr. Burdett, contains eight beds, and cost in building and furnishing hard upon 3,000*l.*, ought not to be taken as a model; nor do we desire, except in very special cases, such an extensive establishment as that of which the plan and elevation are given, designed by Mr. Ernest Turner.

Miscellanea.

Public Offices.—The report of the Select Committee appointed to inquire as to the propriety of concentrating the various public buildings in the metropolis has been issued. The Committee strongly urge the expediency of some such concentration, as they are of opinion that delay will lead to greater expense in the future. Three plans were submitted to the committee. The first was that of Sir Henry Hunt, consulting surveyor to the Office of Works. He proposes to purchase all the blocks of buildings bounded by Parliament-street on the east, St. James's Park on the west, Great George-street on the south, and Charles-street on the north. This contains 133,000 superficial feet of building area, and the estimated cost of the ground amounts to 1,300,000*l.* On this block Sir Henry Hunt provides accommodation for the War Office, the Admiralty, and the Council Office; he proposes to remove the old buildings in Downing-street, and to erect houses fronting the Park for the First Lord of the Treasury and the Chancellor of the Exchequer; to add a story to the Treasury Offices, to place the Board of Trade between them and the Horse Guards; to retain the Horse Guards; and to place the Office of Works and the Office of Woods between the Horse Guards and the present Admiralty, and thus to leave the existing Admiralty building at the disposal of the Government. Another plan was submitted by Mr. Mitford, suggesting that the public offices should be placed on the west side of Charing-cross; and the third plan, submitted by Mr. Cates, proposed acquisition of one side of Whitehall-place, and the houses in Whitehall-gardens up to Montegu House.

The Hastings Builders.—The master builders of Hastings, St. Leonards, and district, have formed a trade association, with a view of promoting good fellowship and unity of action in trade affairs. Of course they could not accomplish this satisfactorily without a feast. Accordingly, an inaugural dinner took place on the 3rd inst., when a company numbering about forty persons assembled. In the absence of the President of the Association, Mr. Walter Longhurst took the chair, the vice-chair being filled by Mr. Councillor J. Wood. The company included Messrs. David Parks, F. Amon, H. T. Develin, W. J. Morgan, W. R. Reeve, A. Collins, R. Novis, C. Arnold, G. Geary, G. Austin, G. Sacre, H. Buller, C. Shortell, W. Nowers, A. Vidler, H. Vidler, A. Vidler, jun., F. H. Davis, T. J. McConnel, G. Sharp, H. Gasson, J. Jones, G. King, G. Hare, J. Grisbrook, G. Gough, R. Munday, E. Harman, H. Chapman, W. Steel, J. Ford, S. Starr, T. Collins, J. N. Beaney, &c.

Tree Murder.—The plane-trees in the garden of the churchyard of St. Botolph, Bishopsgate, are now (says the *Gardeners' Magazine*) in a nice condition to illustrate the first principle of tree murder. Those planted on either side of the public pathway to form a shady avenue have been carefully "pruned back," and are worthy of a momentary inspection by such as are interested in town trees, and know something of the way they should be managed. It will be observed that they have made a nice growth, and if left unpruned would now meet overhead and make a delightful shade, which pedestrians would appreciate. But as they have been severely cut in, their natural beauty is marred, and their vigour of root action diminished. There are no windows robbed of light by these trees, and there is no reason apparent why they should be pruned at all.

Model Employers of Labour.—We clip the following paragraph from a North Country paper:—In South Cumberland two iron firms have subscribed 9,000*l.* between them towards building a church for the use of their workpeople, the total cost of the edifice being but 4,000*l.* more. A week or so ago the Bishop of Carlisle consecrated this monument of local munificence, thus adding a worthy item to others of a similar nature, which could be mentioned. Although such hard things are sometimes said with regard to the relations between the capitalist and his ironworking dependents, such instances as the one quoted tend to remove even a deep-rooted prejudice which may be felt in the matter. But many such acts could be quoted on behalf of large employers of labour. The Peases, of Darlington, in each successive generation, leave behind them traces of the noblest and wisest philanthropy, and if we go a little further afield, what of Titus Salt, the Crossleys of carpet-making fame, Mark Firth, of Sheffield, a Peabody, and a host of others? The Dowlais Iron Company have under their especial charge one of the largest and best-regulated elementary schools in Great Britain, and choose to conduct it independently of the Local School Board.

Proposed Improvement at Millbank.—At a meeting of the Metropolitan Board of Works on the 29th ult., Mr. White moved,—"That it be referred to the works and general purposes committee to consider and report as to the advisability of the Board applying to Parliament next session for power to form a new street, from Abingdon-street to Millbank Penitentiary, and to embank that part of the river Thames." The mover said he had to ask the Board kindly to make this reference, in order that he might be enabled to state to the committee certain financial reasons why this improvement should be proceeded with with as little delay as possible, which reasons it would not be wise to state publicly before the Board. The motion having been seconded, Mr. Rooke objected to the reference being made. A committee of the House of Commons had expressed themselves so decidedly with reference to this proposed metropolitan improvement that the Board had no alternative but to withdraw it from their Bill, and there the matter ought to rest, at any rate for the present. Mr. Selway also objected to the motion, and remarked that the Board had no intention whatever of going to Parliament next session with a Streets Improvement Bill. The motion was ultimately carried.

A Halifax Lodging-house.—A large and substantial building has just been opened in Winding-road, Halifax, adapted to accommodate a large class of working men who, from necessity, are compelled to live in lodging-houses. The building has been erected between the bottom of Ann-street and Gaol-lane. It is four stories high. The basement is occupied as an eating-house, there being one entrance to the large dining-room, which is light and lofty; and another to the shop, where the edibles and drinkables are served. Behind is a sitting-room, where the residents can read the newspapers, &c. A large cellar, the full length of the building, affords accommodation for washing, cooking, &c., and is well lighted from the front. On the third floor there is sleeping accommodation for thirty workmen. The room is lighted by lofty windows, both in the front and back of the building. On the top floor there is accommodation for twenty-eight men. The rooms are lofty, light, airy, and cheerful. The *Halifax Guardian* says that what is now urgently needed is a similar lodging-house for females.

A New Mode of Felling Trees.—Amongst other applications of electricity by man is that of felling trees. An American gentleman a few years ago patented a process of this kind. Two gentlemen in Bombay have also patented a similar method, and which they recently submitted to public experiment. The plan, as detailed by a local paper, is simple. The two ends of the copper wires of a galvanic battery are connected with platinum wire, which, of course, instantly becomes red-hot, and while in that state it is gently see-sawed across the trunk of the tree to be felled. At present no platinum wire has been made thick enough to withstand the continual friction; but when this is done, it is calculated that a tree, which at present takes two hours to fell, will come to the ground by this process in fifteen minutes. The method has this advantage, that there is no waste of wood and no sawdust.—*Farmer.*

The Attempt to Raise the "Vanguard."—The preliminary experiments on the wreck of that ill-fated ironclad, the *Vanguard*, have, it is stated, resulted very satisfactorily, and the ultimate success of the attempt to raise her is thought to be a matter of certainty. It would seem that the position of the ship is most favourable for lifting by the means prepared by Captain Coppin, and approved of by the Lords of the Admiralty, viz., by means of huge steel wire ropes passed under her, and made fast above to immense pontoons. Captain Coppin intends to begin at once to get the lifting ropes placed under her, so as to be ready for making the lift as soon as the pontoons are completed. The pontoons will be constructed on the Clyde, and each will have a lifting power of 3,000 tons, and will be specially constructed to meet the requirements of the work, which it is hoped they may accomplish. The divers employed in recent operations, and engaged for the completion of the work, belong to the staff of Messrs. John Clegg & Co., of Donaghadee.

Arundel Church and the Duke of Norfolk.—We have before alluded to the dog-in-the-manger policy pursued by the Duke of Norfolk in reference to the Collegiate chapel or chancel of Arundel Church. When the church was restored, some years ago, the churchwardens addressed the Duke of Norfolk, assuming a right to the collegiate chapel, adjoining the church, and the Duke, acting on legal advice, caused a substantial brick wall to be erected in the archway which separated the chapel from the church. The churchwardens did not contest the right,—although the two buildings are continuous, and the collegiate chapel had for years been open and called the "chancel of the church." All access to the building from the church has, therefore, been stopped from that period, and light, air, and ventilation denied. We learn from the *West Sussex Gazette* that the Vicar of Arundel has caused a breach to be made in the brick screen, so as to admit light and air into the church. The act is one in defiance of the alleged rights of the Duke of Norfolk, and may lead to more discord.

Automatic Railway Coupling.—The advantages claimed Brailsford's patent automatic railway coupling, just introduced, are (1), the great saving of risk to life, there being no necessity to go between the trucks, either in coupling or uncoupling; (2) great simplicity and reliability,—it can, it is said, be depended on in the darkest night or in the thickest fog, and cannot fail to act on the sharpest curve, or by reason of one coupling being higher than another; (3) it does not condemn the existing couplings, and can be fitted to them cheaply and expeditiously; and (lastly) the enormous saving of time effected. Twenty trucks, instead of taking almost as many minutes to couple by hand, can be joined in two or three seconds. In shunting in and out of sidings, the engine alone can do all the coupling required, one man only being required to uncouple, which can be done, it is asserted, with perfect safety from either side of the truck, even when going at considerable speed. It is well worth the notice of railway companies and all owners of rolling-stock.

A Good Example.—The *Glasgow Herald* says,—"No more important duty can fall upon the authorities of a great and populous city like Glasgow than that of supplying proper, cheap, and well-arranged lavatories for the use of each sex of the community. This has been done to some extent throughout the city for the benefit of the male portion, and the Local Authority has now opened three "lavatories," under proper management, for the special accommodation of females of every class in the following places, viz.:—One at the north end of Jamaica-street Bridge, one at the south end of Stockwell-street Bridge, and one in the new buildings of the Corporation, next the jail, in Jail-square, each surmounted with a sign painted 'Ladies' Waiting-room and Lavatory.' Should these places be taken advantage of to any considerable extent, others will be opened at different points in the city." London and other large cities will do well to take a lesson from Glasgow on this matter.

Hindley Cemetery Competition.—In the recent competition for cemetery chapels, and for the laying-out of the ground, the Burial Board have awarded the first premium to Mr. G. Heaton, Wigan; the second, to Mr. Freeman, Bolton-le-Moors; and the third, to Messrs. Garside & Johnson, of Southport.

Yet Another Use for Paper.—The uses to which paper has been put of late years as a substitute for wood, iron, cloth, &c., have not, apparently, exhausted the directions in which it may be made serviceable to mankind. It is reported that an officer in the navy has obtained a patent for sheathing vessels with paper, to protect them from corrosion and the gathering on them of sea-grasses and barnacles. It is said that paper was used on the bottom of a vessel in the dock at Portsmouth for some other purposes, and that the officer obtained his patent because, on the return of the vessel to the dock after a voyage, he discovered that every part of the vessel below the waterline was covered with weeds, grasses, barnacles, except the papered portion. He has since experimented with paper as a protector of ships' bottoms, and is said to have found that when a cement of waterproof paper is used, it is the best and cheapest material for protecting iron.

Compo Balconies.—Last week Dr. Hardwicke held an inquest at the Paddington Coroner's Court as to the death of John Mason, 35, of 22, Lawrence Poultney-lane, City. The owners of No. 65, Palace Gardens-terrace, Kensington, engaged Mr. Howard, a builder, of Moscow-road, Paddington, to repaint the front of the house. On Wednesday the deceased and another man went upon the balcony, which was made of compo and had no support. After being there a few minutes the balustrades gave way, and the deceased was thrown to the ground. He was picked up in an insensible condition and taken to St. Mary's Hospital, where it was found that he had received a fracture of the skull, from which he died in a few minutes. It was stated that the whole of the balconies in this terrace were of a dangerous character. The jury returned a verdict of "Accidental death." If another disaster should occur here the verdict would be different.

South Kensington Museum.—The list of Royal Donors to the Museum has received an addition in His Imperial Majesty, the Shah of Persia. The Shah has been pleased to present to the Museum a valuable assortment of modern Persian textiles, consisting of fourteen carpets of various designs, and pieces of manufacture; twenty-four pieces of patchwork embroidery, made at Resht, to serve as table carpet, tray, and cushion-covers; twenty-six pieces of Kerman silk embroidery on shawl (Silsileh) in the form of waistbelts, bedquilt, pillow, and table-covers, &c.; and ten other pieces of various textiles. An interesting letter from his Excellency the Emin-ul-Mulk, President of the Council, explains the circumstances of His Majesty's liberal gift.

Bursting of a Drainage Outfall.—Great damage has been caused at the outfall works of the King Sedgmoor main drain at Dunball, near Bridgewater. The new auxiliary cut, constructed at a cost of 4,000*l.* or 5,000*l.*, suddenly collapsed, owing, it is supposed, to the shifting of quicksand beneath, and to the combined action of the tide and fresh water accumulated by the late heavy rains. Several massive iron pipes, 6 ft. in diameter, burst with a loud report. A considerable portion of the turnpike road was carried away, and a house close by was undermined to such an extent that its fall is anticipated.

Fall of Houses in Bethnal-green.—At a few minutes before six o'clock on Tuesday evening an accident took place in the Bethnal-green-road, whereby two persons were killed. Some scores of houses in that road have lately been purchased by the Metropolitan Board of Works, for the purpose of having the road widened, to improve the route to Victoria Park. The houses, Nos. 112 and 114, were unroofed, and the outer walls fell into the carriage-way.

Cleansing Public Buildings.—The West-end Branch of the Bank of England in Burlington-gardens has just been cleansed outwardly by one of Messrs. Merryweather & Son's steam fire engines. The performance occupied just one working day as contrasted by several weeks' labour if done by hand.

An Unsuccessful Aquarium.—It has been resolved to close the Manchester Aquarium, and wind up the affairs of the Company. Want of appreciation on the part of the public is the reason assigned for this unfortunate collapse. Was there no other?

Social Science Congress.—Lord Ronald Leveson-Gower has accepted the office of President of the Art Department at the forthcoming Congress to be held at Aberdeen.

Dewsbury.—Mr. William Thornes, of Bradford, has been appointed Assistant-Surveyor for the Borough of Dewsbury, at a salary of 150*l.* per annum. There were forty-three applications.

TENDERS.

For house and shop in Wood-street, Walthamstow, for Messrs. Budd & Co. Mr. J. H. Swan, architect. Quantities by Mr. Thomas M. Deacon:—

Tarrant	£3,633 0 0
Deards	3,487 0 0
Mitchell	3,300 0 0
Mortar	3,296 0 0
Reed	3,250 0 0
Baguley	3,115 0 0

For house, shop, and furniture warehouse in Ebury-street, London, for Mr. James Marshall. Mr. F. Stone, architect. Quantities supplied:—

General Contract.

Lathey, Brothers	£2,650 0 0
King & Son	2,555 0 0
Shaw	2,349 0 0

Ironwork only.

Shaw	£30 0 0
St. Pancras Ironwork Company	450 0 0
Mayhew	443 0 0

For alterations to the Railway Hotel, Anerley, and two new houses (with shops) adjoining. Messrs. Bird & Walters, architects. Quantities supplied:—

Downs	£2,755 0 0
Nightingale	2,740 0 0
McLachlan & Son	2,694 0 0
E. & E. Smith	2,614 0 0
Taylor (accepted)	2,587 0 0

For master's house, Southwick, for the Southwick School Board. Mr. F. W. Hyde, architect:—

Trigge & Willett (accepted)	£324 10 0

For laying out two new streets, Kemp-town, Brighton, with drainage, metalling, curbing, &c. Mr. F. W. Hyde, surveyor:—

Bruton	£1,690 0 0
Barnes	1,515 0 0
Howard (accepted)	1,491 0 0

For alterations and additions to the Gladstone Hotel, North-street, Brighton, with bowling alley, assembly-room, billiard-room, and entrances in rear of hotel, for Mr. J. S. Ashton. Mr. F. W. Hyde, architect:—

Patching & Webber	£3,046 0 0
Lockyer	2,994 0 0
Cheeseman & Co.	2,940 0 0
Nash & Co.	2,928 0 0
Colwell	2,780 0 0
Bruton	2,650 0 0
Henning & Co.	2,620 0 0
Anscombe	2,577 0 0
Howard	2,575 0 0
Barnes	2,563 0 0

For rebuilding the church of St. Lawrence, Essex. Mr. R. Wheeler, architect:—

Gosette	£1,616 0 0
Read	1,209 0 0
Stammen (accepted)	1,565 0 0

For a villa residence, stables, and lodge, at Grove-hill, near Bray, County Wicklow, Ireland, for Mr. James Jameson. Messrs. Millar & Symes, architects. Quantities (for the villa only) by Mr. Hans Harford:—

Millard	£20,450 0 0
Moyers	19,700 0 0
Kinninmont & Son	19,523 0 0
Bolton	18,850 0 0

For the erection of a villa residence, on the Mill Green Estate, Margate, for Mr. Wm. List. Messrs. Smithies & Gladman, architects:—

Bushell & Sons	£2,036 0 0

For the erection of two semi-detached residences at Brentford. Messrs. Smithies & Gladman, architects:—

Barns	£1,953 0 0
Gibson	1,802 0 0
Taylor	1,598 0 0
Falkner	1,547 0 0
Nye	1,511 0 0
Beauchamp	1,419 0 0

For repairs and decorations at 36, Kensington Park-gardens. Mr. H. H. Collins, architect:—

Crossley	£830 16 1
Poole	756 0 0
M'Intosh	747 0 0
Whiteley	715 0 0
Varnall & Griffiths	658 0 0
Hayward	660 0 0

Accepted for the Bacup Branch of the Lancashire and Yorkshire Bank. Mr. Harry T. Percival, architect:—

Smith & Co. (masons)	£906 0 0
Sutcliffe (joiners)	489 0 0
Clegg (plumber, &c.)	240 0 0
Collinge & Co. (plasterers)	109 0 0
Rushton (slater)	80 0 0

For alterations, &c., and new shop-front to No. 1, High-street, Shoreditch:—

Thomerson (accepted).

For the first portion of Messrs. Mansell's factory for the widening of Theobald's-road:—

Downs & Co. (accepted).

For pulling down and rebuilding the Angel and Crown, Warwick-street, Golden-square. Mr. Henry R. Cotton, architect. Quantities by Mr. A. J. Gate:—

Manley & Rogers	£4,677 0 0
Foxley	4,497 0 0
Williams & Son	4,490 0 0
Shaw	4,118 0 0
Patrick	3,947 0 0
Newman & Mann	3,8[illegible]0 0 0
Toms (accepted)	3,983 0 0

For semi-detached villa residences, Caterham Valley, Surrey, for Mr. A. Weller. Mr. John Glenn, architect:—

Bayes, Brothers, & Allen	£2,790	0	0
Longley	2,702	0	0
Staines & Son	2,669	0	0
Cullum	2,554	0	0
Ennor, Julian, & Co.	2,500	0	0
Ridge (accepted)	2,412	0	0

For erecting new class-rooms, enlarging school-room, and re-stuccoing outside of chapel for the Building Committee of the Brunswick Sunday Schools, St. Paul's, Bristol. Messrs. J. W. Trew & Sons, architects:—

Stevens & Gardiner (accepted)	£1,563	0	0

For erecting the Chiddy Memorial Cottage for the Committee of the Chiddy Memorial Fund, Hanham, near Bristol. Messrs. J. W. Trew & Sons, architects:—

King	£273	0	0
Stevens & Gardiner (accepted)	267	0	0

For additions to Baptist Schools, Wycombe Marsh, Bucks. Mr. Arthur Vernon, architect:—

Silver	£416	0	0
Nash	368	0	0
Hunt	359	10	0
Taylor	353	0	0

For new workmen's club, Tyler's-green, for Sir Philip Rose, bart. Mr. Arthur Vernon, architect:—

Woodbridge	£850	0	0
Silver	747	0	0
Loosley	670	0	0
Wheeler	573	0	0

For new warehouse buildings, St. Mary-Axe. Mr. H. H. Collins, architect. Quantities supplied by Messrs. Batstone, Brothers:—

Bracher & Son	£9,420	0	0
Scrivener & White	9,185	0	0
Newman & Mann	9,030	0	0
Waldram & Co.	9,020	0	0
Browne & Robinson	8,960	0	0
Morter	8,845	0	0
Brass	8,815	0	0
Bayes, Brothers, & Allen	8,750	0	0
Merritt & Ashby	8,737	0	0
Marx	8,700	0	0
Nightingale	8,563	0	0
Abraham	8,468	0	0
Kirk & Randall	7,840	0	0

For construction of new sewers in fifteen streets, Chelsea. Mr. G. H. Stayton, C.E., surveyor to the Vestry:—

Contract No. 1.

Brass	£4,658	0	0
Mears	3,622	0	0
Pearson	3,284	0	0
Thompson & Son	3,250	0	0
Killingback	3,250	0	0
Nowell & Robson	3,159	0	0
Ford & Norris	3,073	0	0
Braid & Co.	3,000	0	0
Neave & Son (accepted)	2,614	0	0

Contract No. 2.

Brass	£4,200	0	0
Mears	3,461	0	0
Pearson	3,186	0	0
Thompson & Son	3,000	0	0
Prout	2,955	0	0
Killingback	2,900	0	0
Ford & Norris	2,805	0	0
Braid & Co.	2,800	0	0
Nowell & Robson	2,799	0	0
Neave & Son (accepted)	2,420	0	0

Contract No. 3.

Brass	£3,790	0	0
Mears	3,231	0	0
Killingback	2,950	0	0
Prout	2,900	0	0
Thompson & Son	2,800	0	0
Pearson	2,843	0	0
Nowell & Robson	2,709	0	0
Ford & Norris	2,629	0	0
Braid & Co.	2,600	0	0
Neave & Son (accepted)	2,247	0	0

TO CORRESPONDENTS.

A. A. (we cannot advise in private disputes).—Z. C. (If we gave an opinion on *ex parte* statements, we should simply mislead).—B. T. notice was already in type).—W. D. (the number of stories differs. In one block there are ten).—H. L. (will appear).—W. T.—C. M.—H. H.—L. L.—R. D.—W. T. & Sons.—S. H.—W. W. L.—W. W.—H. H. C.—A Marbler.—J. F. M.—A. V.—M. & Sons.

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By order of the Board,
F. HUGHES HALLETT, Clerk.
Ashford, Kent, July 5, 1877.

HANDSWORTH URBAN SANITARY DISTRICT, in the County of Stafford.—APPOINTMENT of SURVEYOR.—The Handsworth Local Board are desirous of receiving Applications for the APPOINTMENT of SURVEYOR. The person appointed will be required to give his whole time to the service of the Board, to reside in the district, and to enter upon his duties at Michaelmas next. His duties will be to take levels, make surveys, properly construct and repair roadways, superintend the paving, curbing, and channelling of streets, prepare quantities and estimates of sewerage works, and superintend the construction of such works. Also to examine plans of all new streets and new buildings, and to inspect such streets and buildings during their construction, to superintend the men and teams employed upon the roads, and to generally carry out the orders of the Board. Security to ensure the due performance of the duties will be required in the sum of 200l. Salary, 300l. per annum.—Applications, stating age, qualifications, and experience, and enclosing six original testimonials, must be sent under seal, and endorsed "Surveyor," to me at my Office, Church-street, West Bromwich, on or before the 13th of AUGUST next.—By order,
HENRY WARD, Clerk.
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TO GAS and WATER ENGINEERS.—The Birkenhead Improvement Commissioners require the services of a RESIDENT ENGINEER of their Gas and Water Works. He must be thoroughly experienced in the manufacture and distribution of gas, and also understand pumping-machinery and water distribution, and be competent to design and carry out additions to and extensions of both gas and water works. Salary, 400l. per annum.—Applications (with recent testimonials), addressed to the Chairman of the Gas and Water Committee, 30, Hamilton-square, Birkenhead, and endorsed "Engineer," to be sent in not later than FRIDAY, the 17th AUGUST next. Personal canvassing prohibited.
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